Status of DØ Operations

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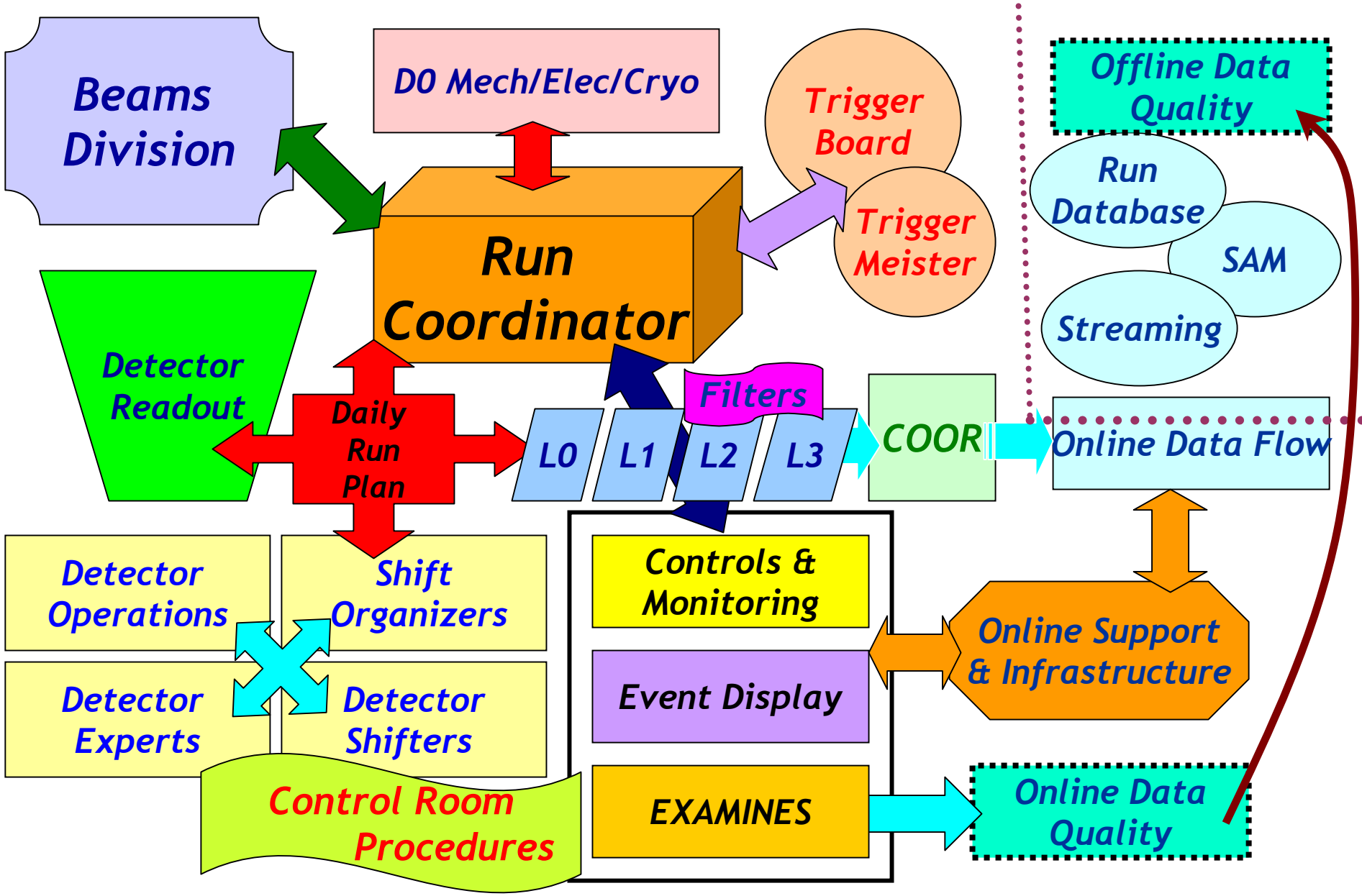
- Introduction
- Tevatron Status & Performance
- DØ Mech/Elec/Cryo Operations
- Control Room & Data Taking
- DØ Shift Status
- DØ Luminosity
- Online Data Quality & EXAMINES
- Online Controls & Alarms
- Online Monitoring
- Data Flow & Streaming
- Offline Data Quality
- Conclusions

Introduction

- **Today's Agenda Includes:**
  - **Status of the Run 2A Detector** *(Leslie Groer)*
  - **L3/DAQ** *(Andy Haas)*
  - **Status of the Trigger System** *(Ron Lipton)*
  - **Status of Computing & Software** *(Amber Boehnlein)*
  - **Status & Plans for DØreco** *(Suyong Choi)*
  - **Report from Object ID groups** *(Daria Zieminska)*
  - **Report from Physics groups** *(Tom Diehl)*

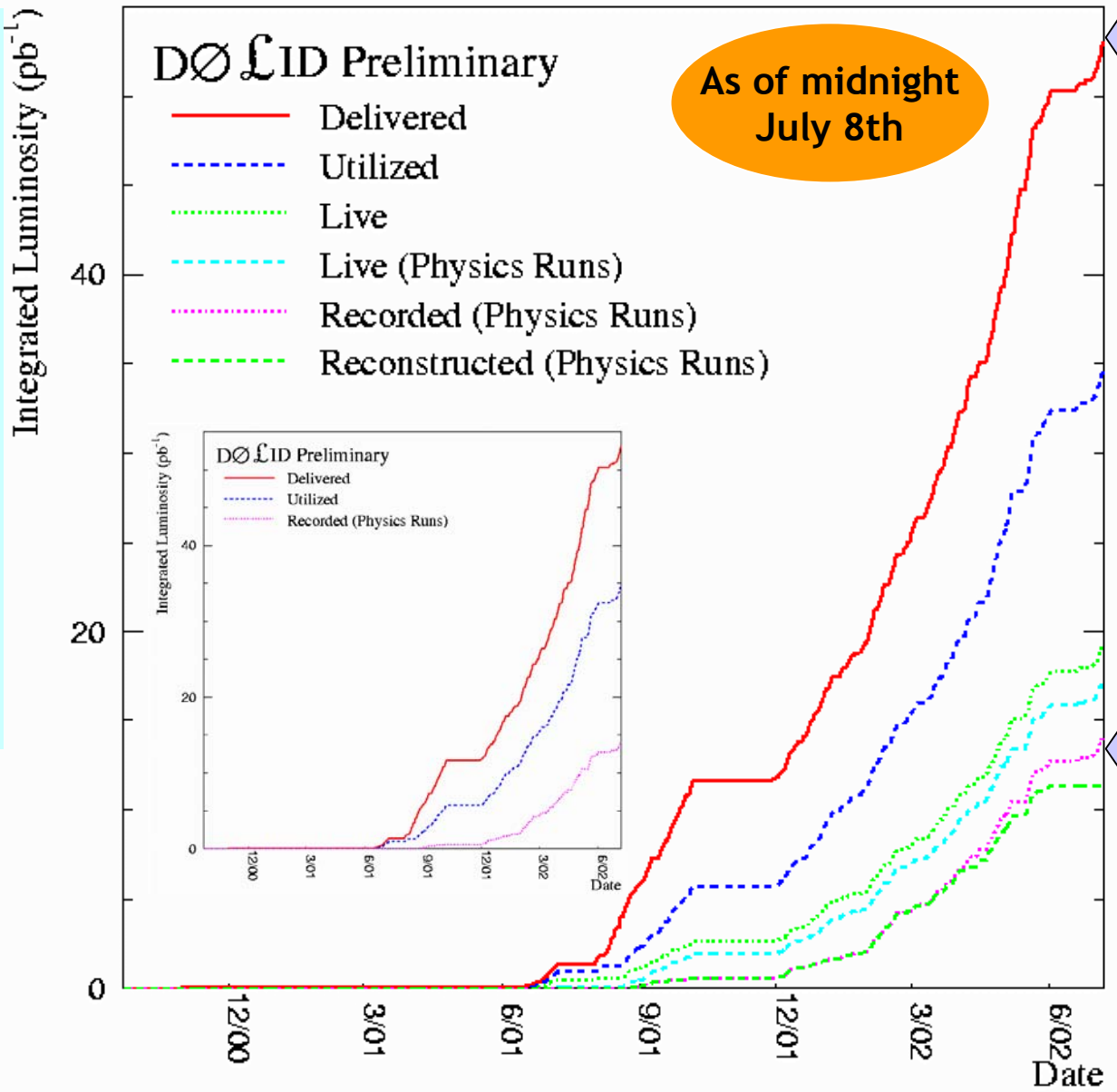
What does that leave?

DØ ~~Commissioning~~ & Operations



DØ - Preliminary Luminosity

- **Delivered:** Official Store
- **Utilized:** Any run that utilized a L1 trigger bit
- **Live:** L1 trigger exposed *(Recording is optional)*
- **Recorded:** L2/L3 losses *(Filtering is not considered a loss)*

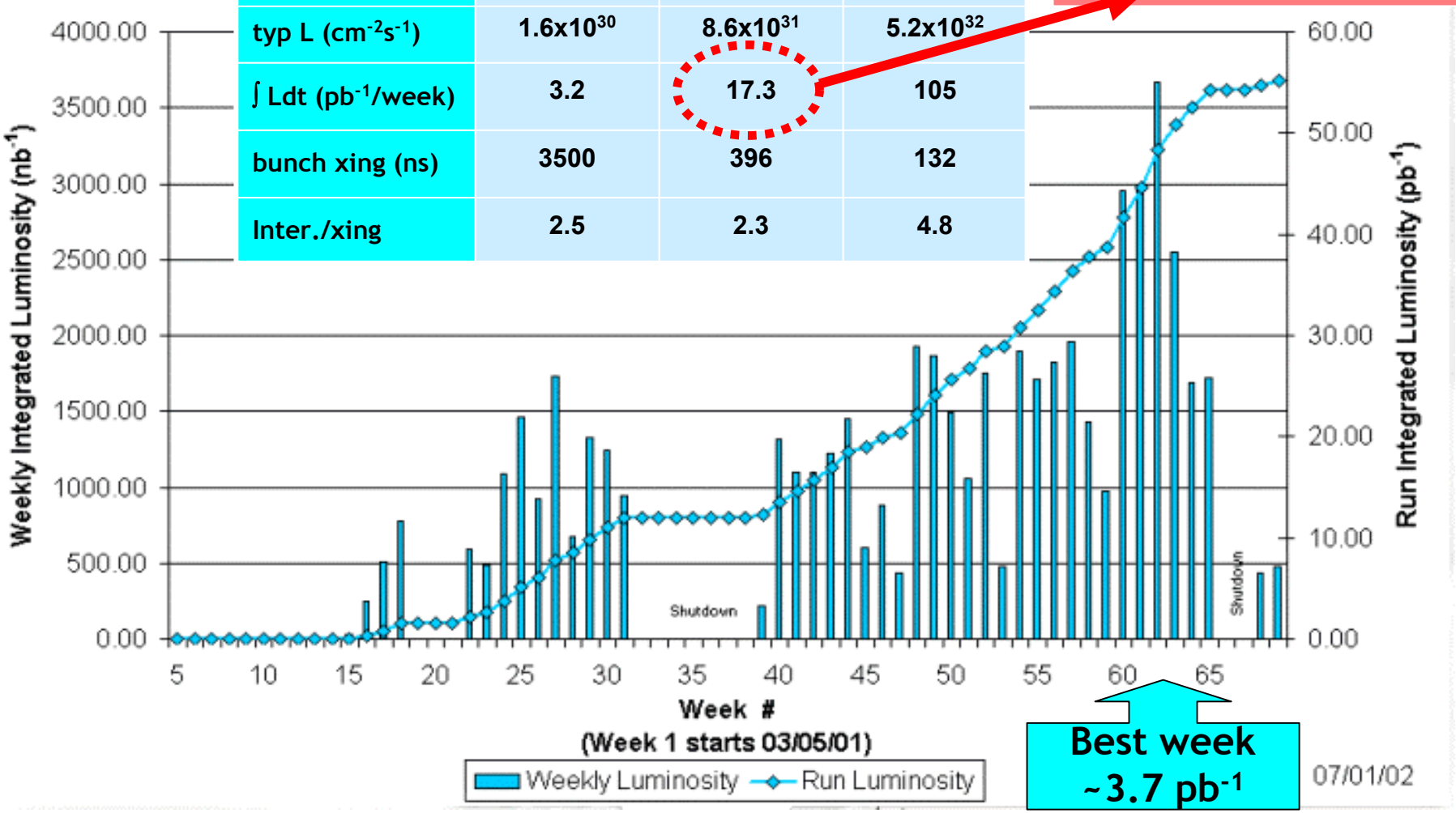


Not as bad as it looks because…

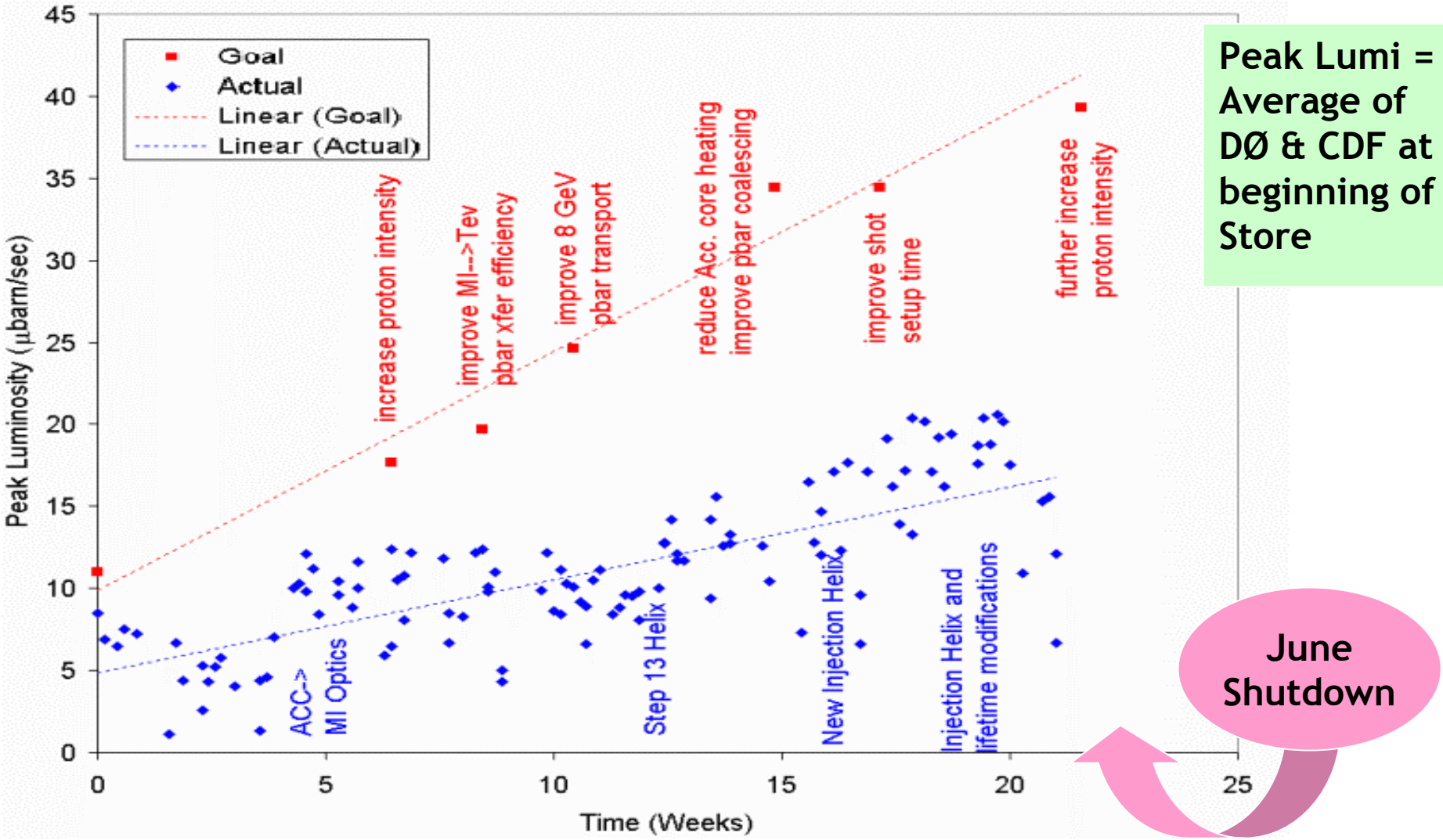
Tevatron - Run 2A Integrated Luminosity

	Run 1b	Run 2a	Run 2b
#bunches	6x6	36x36	140x103
√s (TeV)	1.8	1.96	1.96
typ L ($cm^{-2}s^{-1}$)	1.6×10^{30}	8.6×10^{31}	5.2×10^{32}
∫ Ldt (pb^{-1}/week)	3.2	17.3	105
bunch xing (ns)	3500	396	132
Inter./xing	2.5	2.3	4.8

Expected Run 2A Integrated Luminosity ~2 fb^{-1}



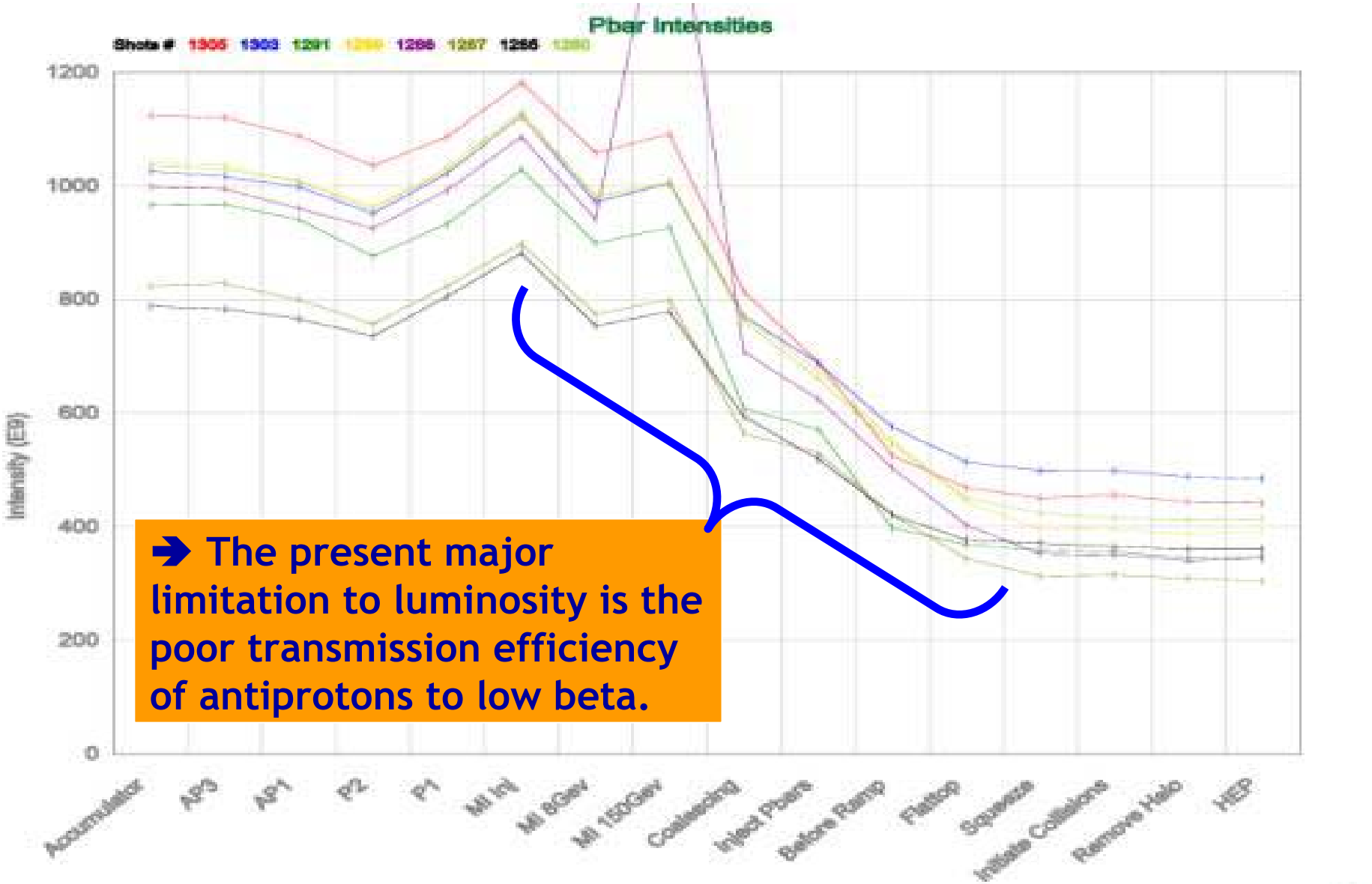
Tevatron - Run 2A Peak Luminosity



Peak Lumi = Average of DØ & CDF at beginning of Store

For more details, see excellent talk by Dave McGinnis given at FNAL Users' Mtg: http://www-visualmedia.fnal.gov/VMS_Site/r_Users2002.html

Tevatron - Pbar Transfer Efficiency



➔ The present major limitation to luminosity is the poor transmission efficiency of antiprotons to low beta.

Tevatron - Plans to Improve Luminosity

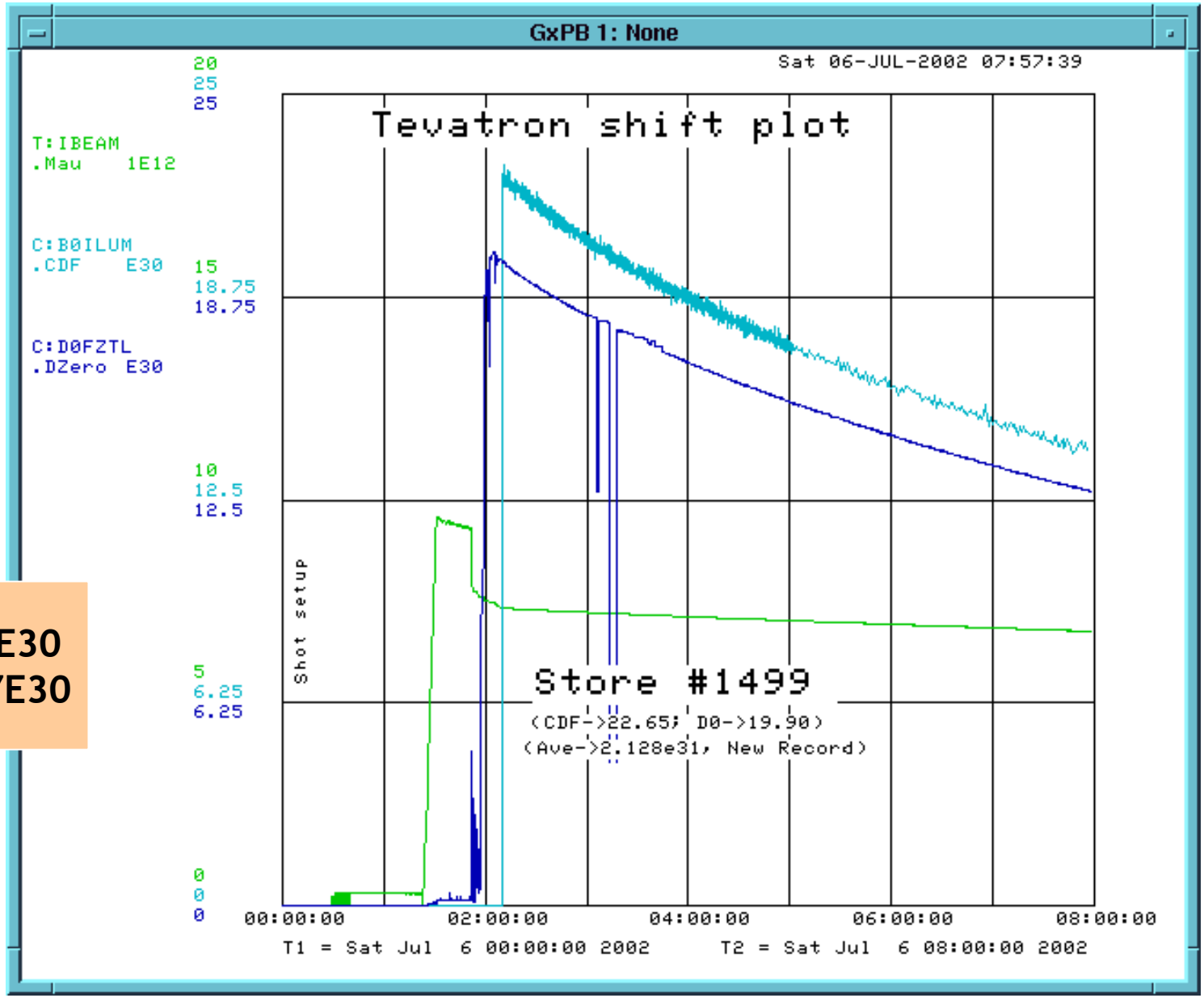
- The major culprit in the poor transmission efficiency of pbars is the long-range effects in the Tevatron which can be mitigated by improving the beam separation
  - Proton beam acts as a "soft" collimator to the pbar beam if the beam separation is too small (<2.5-3σ)
- Solutions
  - Improved helices
    - This has been the major contribution to increasing luminosity over the past couple of months
  - Improved TEV aperture ➔ CØ Aperature will be increased Fall 2002
    - Increased beam separation by ~30%
  - Smaller Pbar emittances
    - Better stochastic cooling at the Accumulator Core *(June shutdown)*
    - Dual lattice mode in the Accumulator *(commissioning stage)*
    - Antiproton injection damping into the Main Injector and Tevatron *(build, install, commission - Summer 2002)*
    - Improved transfer line matching *(October 2002)*

The horizontal emittance of a typical 100E10 antiproton stack is about a factor of 2 larger than the Run II handbook design value.

Stay Tuned…

Tevatron Update: Record Store 1499

Saturday
July 6th
19 hours



DØ Lumi = 19.9E30
CDF Lumi = 22.7E30

DØ Mech/Tech/Cryo Operations

- Ops Techs: One person @ 12-hour shifts (6-6)
  - All safety concerns are directed to Ops Shifter
    - FIRUS & VESDA alarms: Smoke, Water Flow/Leaks, Cryo
    - "Strange" noises & "suspicious" smells
    - Magnets - Up or Down according to Beam Conditions
  - Ops Shifter handles repair & maintenance at DØ facilities
- Weekly day staff of engineering & technical staff
- Eight-man crew to open/close detector for access to central sub-detector components
  - Most successful detector access was made June 28th
    - Needed to find & eliminate East Cathedral water leak
    - Less than 3 hours each to open *(06:30 - 09:00)* and close *(14:00 - 16:00)*

DØ Ops - June 3-13th Shutdown

- Power outage recoveries on June 3 and June 6.
- Scaffolding up & down for C layer PMT replacement.
- Assisted safety panel testing: Power disablement, ventilation, halon, SMT purge.
- Herculite catch "whatever" gutters installed in cathedral area.
- Installed working platform in 3rd floor NAB truss. Measured for additional ones.
- Installed power supply hoisting rails at the east and west pit stairs.
- Dry expander swapped, wet expander rebuilt, helium system recovery.
- Silicon chiller #2 tested, diagnosed with freon leak.
- Replaced all collision hall ODH heads.
- Installed a handrail along the south edge of the VLPC cryostats.
- Changed out 4 BLS (heavy) power supplies with no injuries.
- Started installation of new condensate drains for East collision hall air handlers.
- Increased size and secured pipes for condensate pump in south west collsion hall pit.
- New & improved steps & walkways over cylinders in south east pit.
- Installed and improved working platforms for surveyors (on the air handler platforms).
- Re-lamped fluorescent lighting through out the detector.
- Replaced failed emergency lighting through out the detector.

DØ Ops - Current & Future Work

- **Liquid Helium Refrigerator:** Inventory loss is under control. Second expander engine project progressing, transfer line and valve box being built. New expander on site.
- **Solenoid:** Running stable with magnet helium flow valve in manual.
- **Visible Light Photon Counters Cryostats:**
  - West cryostat cassette space pressure supply valve cleaned. Working better.
  - East cryostat Cold block raised 0.1 K to decrease cassette heater power.
  - LN2 vent line recapture vessel in procurement. Order recirculation pump.
- **Silicon:**
  - Silicon chiller #2 freon leak repaired.
  - Newly calibrated moisture probes for Dewpoint #2 & tracker region installed.
- **Water/HVAC:** *Moisture in collision hall - that time of year.*
  - Plant maintenance diagnosed York chiller freon leaks. Repair of found leaks may exceed their scope of responsibility/ability. Currently York running at lesser capacity. TRANE chillers are okay.
  - MCH heat exchanger leaks investigated for root cause. Repaired units will be tested.
- **High Sensitivity Smoke Detector (HSSD):**
  - Background levels have slowly increased. Still at noise level (10%) of signal.
- **MDT:** Newly calibrated moisture probe installed.
- **Liquid Argon Calorimeter:** Pumping on vacuum jackets of LN2 supply line. Some sweating bayonets in collision hall. Better LN2 subcooler design maturing.

Note: This work does not affect the quantity or quality of data-taking.
Repair & maintenance is necessary for the longevity of the experiment.

DØ Operations: Control Room & Data Taking

Current

- New offline web server
  - Web interface to Logbook
- New monitors & nodes
  - Replaced "fuzzy" screens
  - Upgraded memory (doubled)
  - Need computing power for monitoring & servers
- Current L1/L2/L3 rates are about 200/70/35 Hz
  - Expect to push all three rates

- Small incremental changes
  - Run smoother, smarter, more efficiently, more automatically
- Qualify & quantify downtime
  - SES logs duration & user comments when Runs is paused

Working

- Shift Captain's Manuals
  - Yes, its true - in fact two!
- Standard CR Tutorial
  - Logbook, Taker, How to's, Basic UNIX commands, DAQ Monitor
  - Becoming a shifter shouldn't be so difficult
- Streamlined Daily Run Plan
  - Standard CR Procedures are indexed on a separate web page
- Daily Summary of "What's New"
  - Info from CR, BD, meetings
- Private Shifter Contact List
  - whoDØ is passive & contains only office numbers
- Improved Shift Calendar
  - Automated email reminders
  - Calendars for vetoes & requests
  - Automated shift tallies

DØ Shift Status

- Control Room Shifts
  - CAP, DAQ, CAL, CFT, SMT, MUO, FPD
- Expert Shifts
  - DOC, L2, L3
  - On-Call: CAL, CFT, LUM, SMT
- SAM Shifts

Most Shifts Taken
1 April 2001 - 30 June 2002

- Andrew Askew *Rice* 74
- Horst Wahl *FSU* 64
- Joe Steele *Virginia* 64
- Andy Haas *Washington* 61
- Ryan Hooper *Notre Dame* 59
- Harald Fox *Northwestern* 56
- Alan Stone *LATech* 56
- Greg Davis *Rochester* 54
- Heriberto Castilla *Mexico* 54
- Bill Lee *FSU* 54

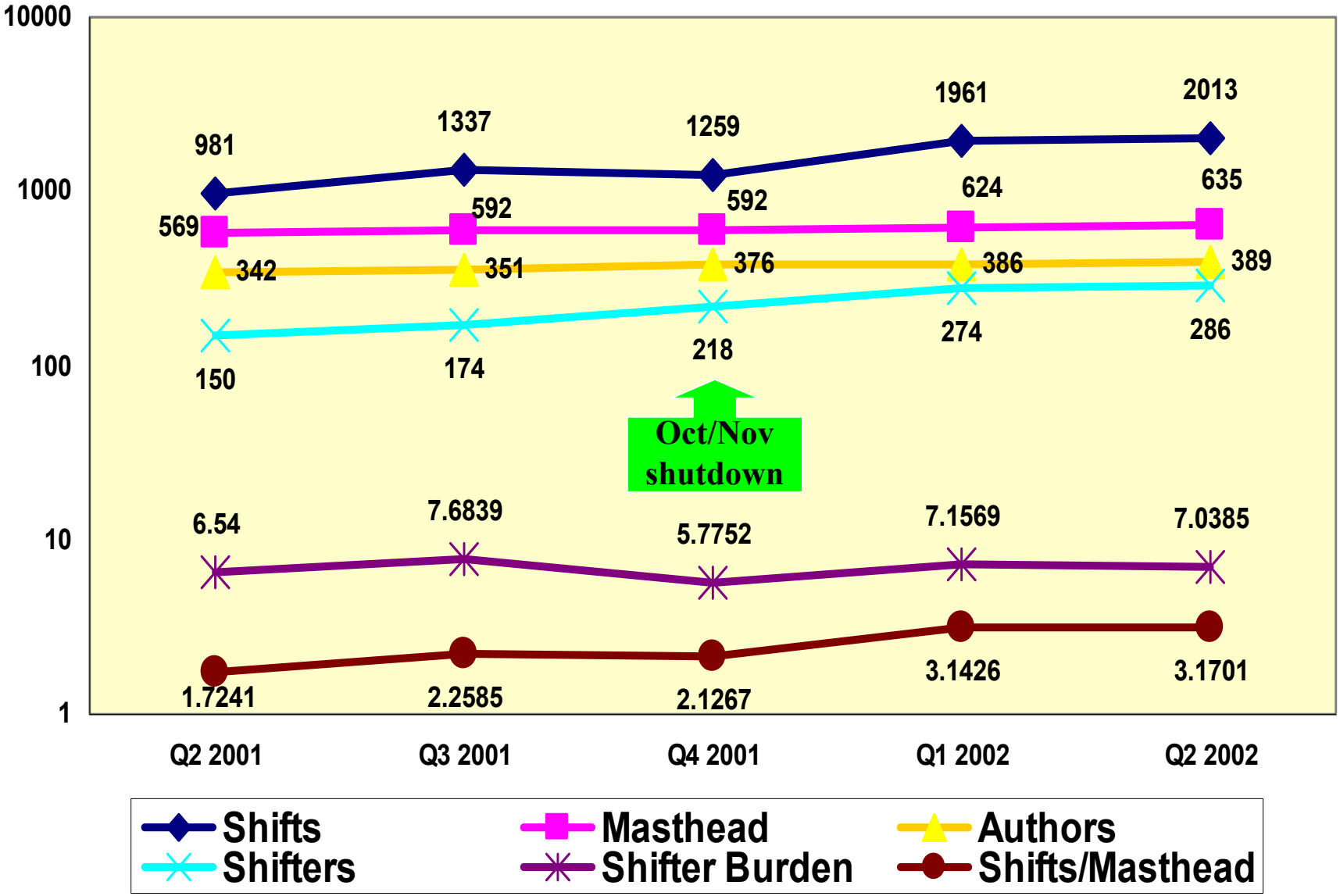
Sum = 596 Shifts = 7.9% Total
(down from 8.7% as of last quarter)

- 1 April - 30 June 2002
  - 2013 Shifts* in last quarter
  - 185 Shifters took at least six shifts *(Avg of 2/month)*
    - The same 185 took 82.5% of the shifts last quarter
  - 31 New Shifters *(Run 2A)* - took 191 Shifts

Very Encouraging

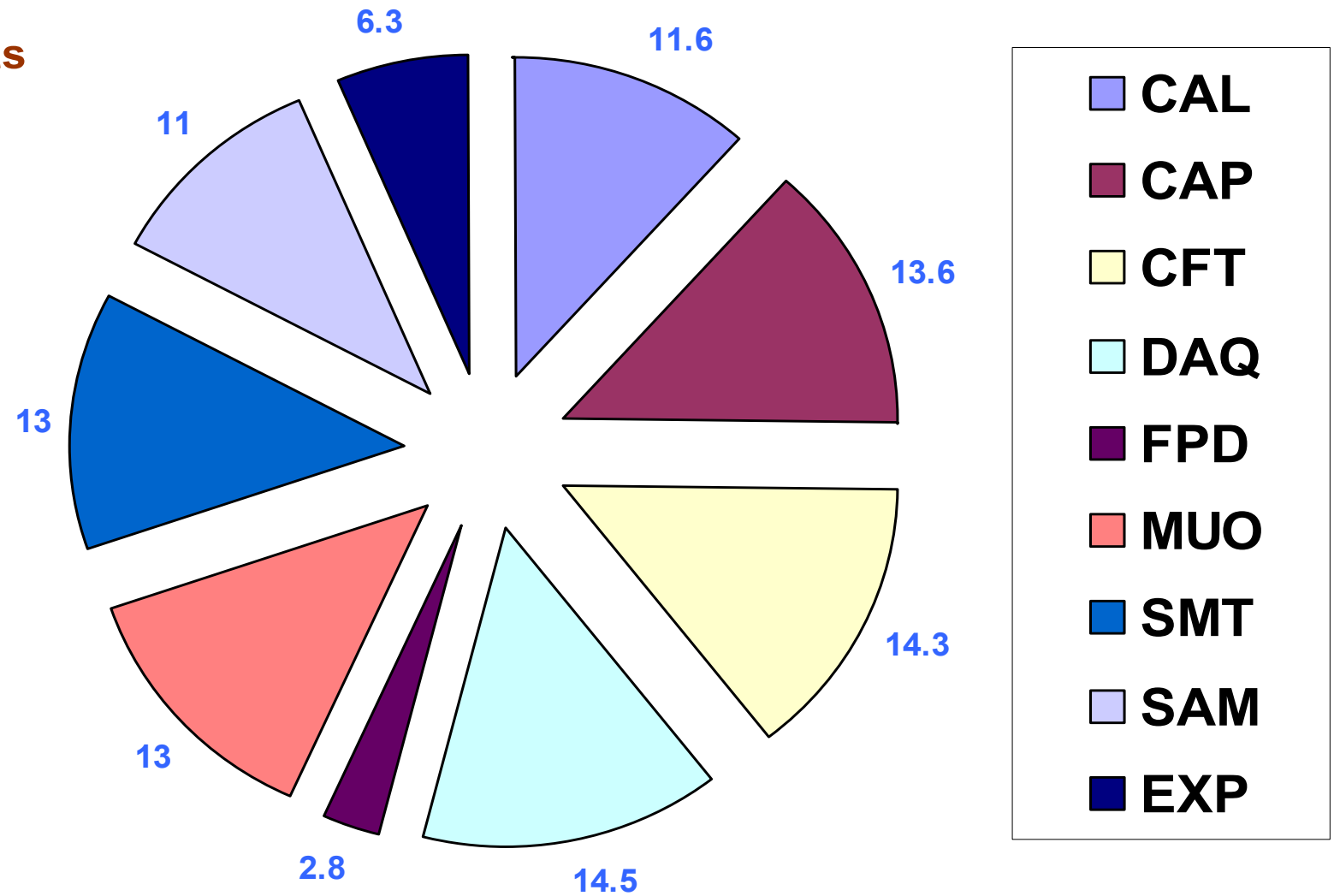
** Numbers are preliminary*

Shift Sums & Averages



DØ Shift Percentages for Q2 2002

Q2 2002 Shifts



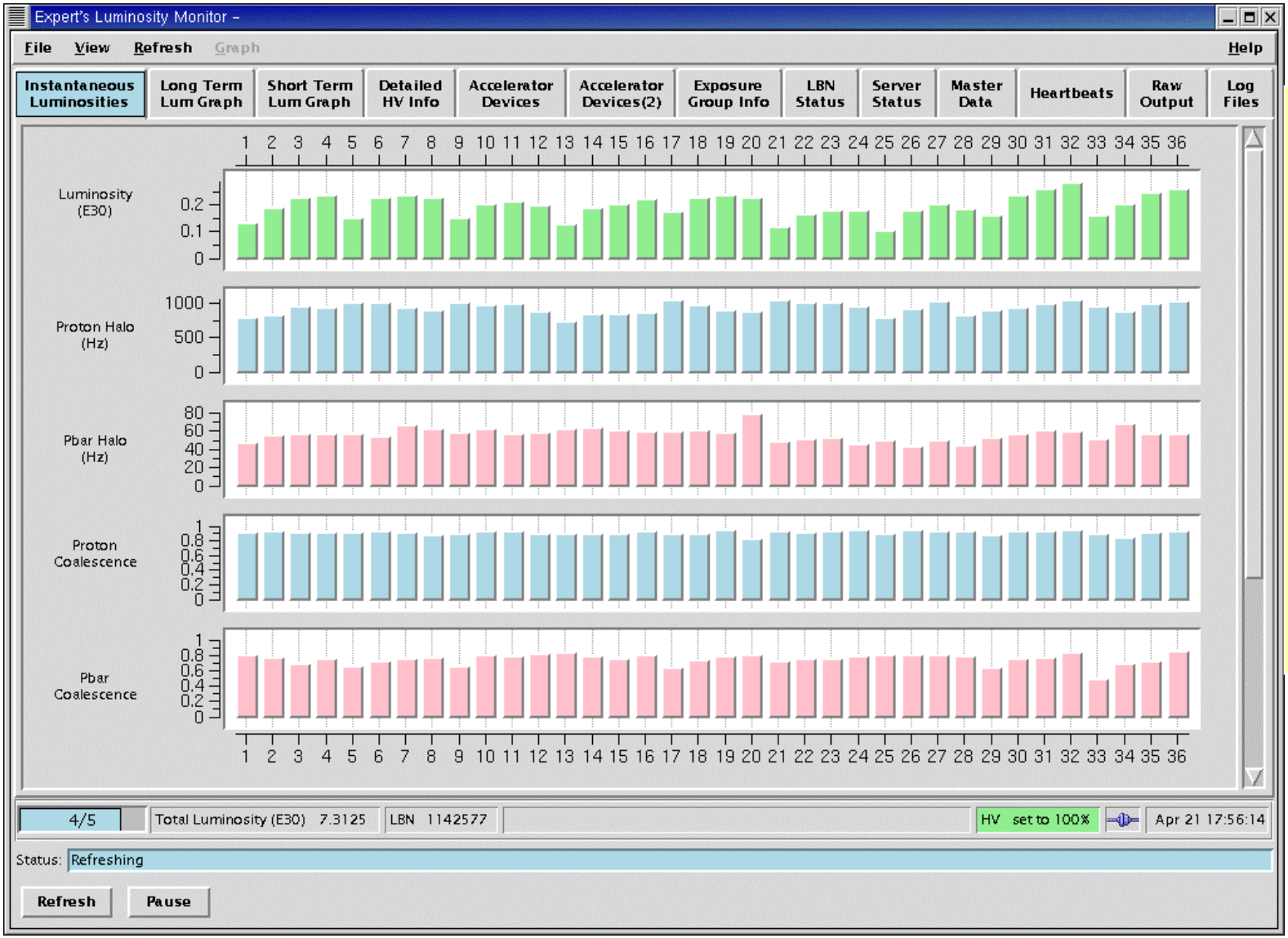
6 Month Goals for Control Room Shifts

- Stabilize Detector Systems
  - Commissioning ➔ Operations
  - Update & simplify docs
- Standard Basic Training
  - Control Room Tutorial
    - Hands-on experience
    - Relieve experts
- Standard System Training
  - New Shifters need more training with varied beam conditions
    - DAQ Shifters take 3 full training shifts
  - Daily Task Lists
    - With or without Beam
- Global Monitor Shifter
  - Physics, Trigger and Vertex EXAMINES
    - Run certification
    - Will add very soon
- Merge Detector Shifts
  - CAL+MUO+FPD(?); SMT+CFT
    - CFT & MUO not yet ready
    - Set milestone - 1 Jan 2003
- Standardize Scheduling
  - Shifters taking 1-2 shifts/mo forget procedure & rarely achieve sufficient proficiency w/system
  - Greater intensity, lower frequency leads to continuity
    - Less time spent retraining
    - Shifter is more involved with the detector system
    - Shifter becomes more responsible for the data quality
    - Shift overlap: "old" shifter facilitates training of "new" shifter
  - Schedule 6-12 months in advance
    - Easier to make travel plans
    - No last minute scramble for shifters

DØ Luminosity DAQ

- Collects & collates info from
  - Luminosity Monitor
  - Trigger (L1, L2, and L3),
  - Data Acquisition System
    - TFW, L3/DAQ & Online
  - Controls System
    - DØ/EPICS & BD/ACNET
  - Offline production system
    - SAM & Reco root-tuples
- Information is archived approximately once per minute.
- Provides real-time monitoring with an extensive GUI running in the DØ Control Room.
- Run summaries are produced at the conclusion of every recorded run.
- Reports summarizing the luminosity, trigger, and operations are produced daily, weekly, and monthly.
- Extensive summary of official DØ farms production is updated nightly.
- Responsible for communications path between the DØ & Beams Division controls systems used by
  - Luminosity
  - Forward Proton Detector
  - Radiation Monitoring
  - Magnet groups
- The Luminosity ID group maintains a 24x7 on-call shifter to support all these activities.

Expert Luminosity Monitor GUI



- Inst. Lumi & Halo Rates
- Long & Short Term Graphs w/DØ & CDF
- Lumi Server Status
- Acc. Devices
- HV Info
- Log Files
- LBN Status
- EPICS/BD
- Triggers

Lite versions available for Shift Captains & Shifters

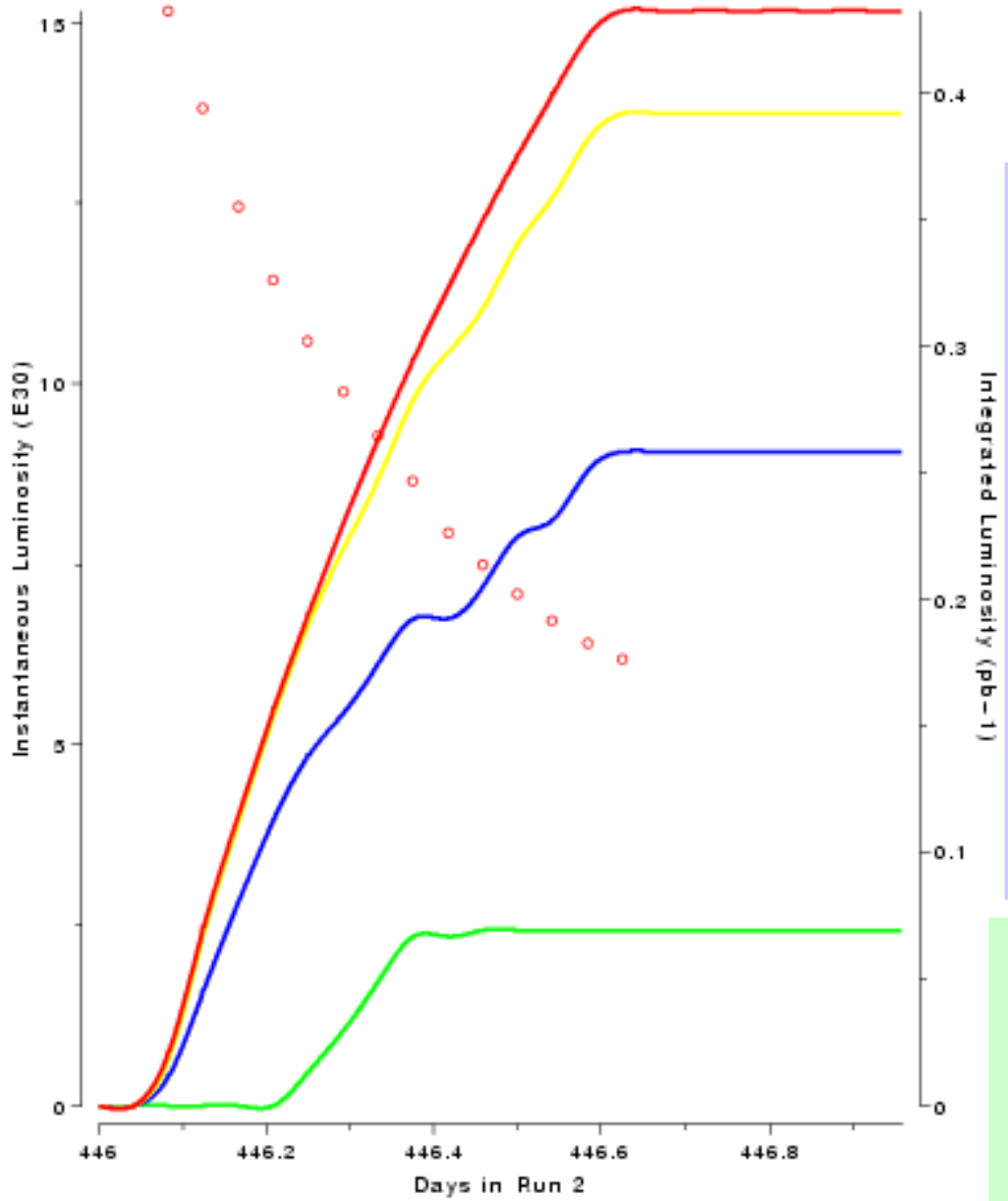
Luminosity: Brief Intermission

Disclaimer

This information is derived from the real-time Luminosity Data Acquisition System running on the DØ Online cluster. These data are subject to change as our understanding improves. The reliability of these data are limited by the stability of the LDAQ and its sources. The information in this file is NOT guaranteed to be either nice or accurate and shall not be considered the official operational status report of DØ or its Luminosity DAQ.

Now, on with the presentation…

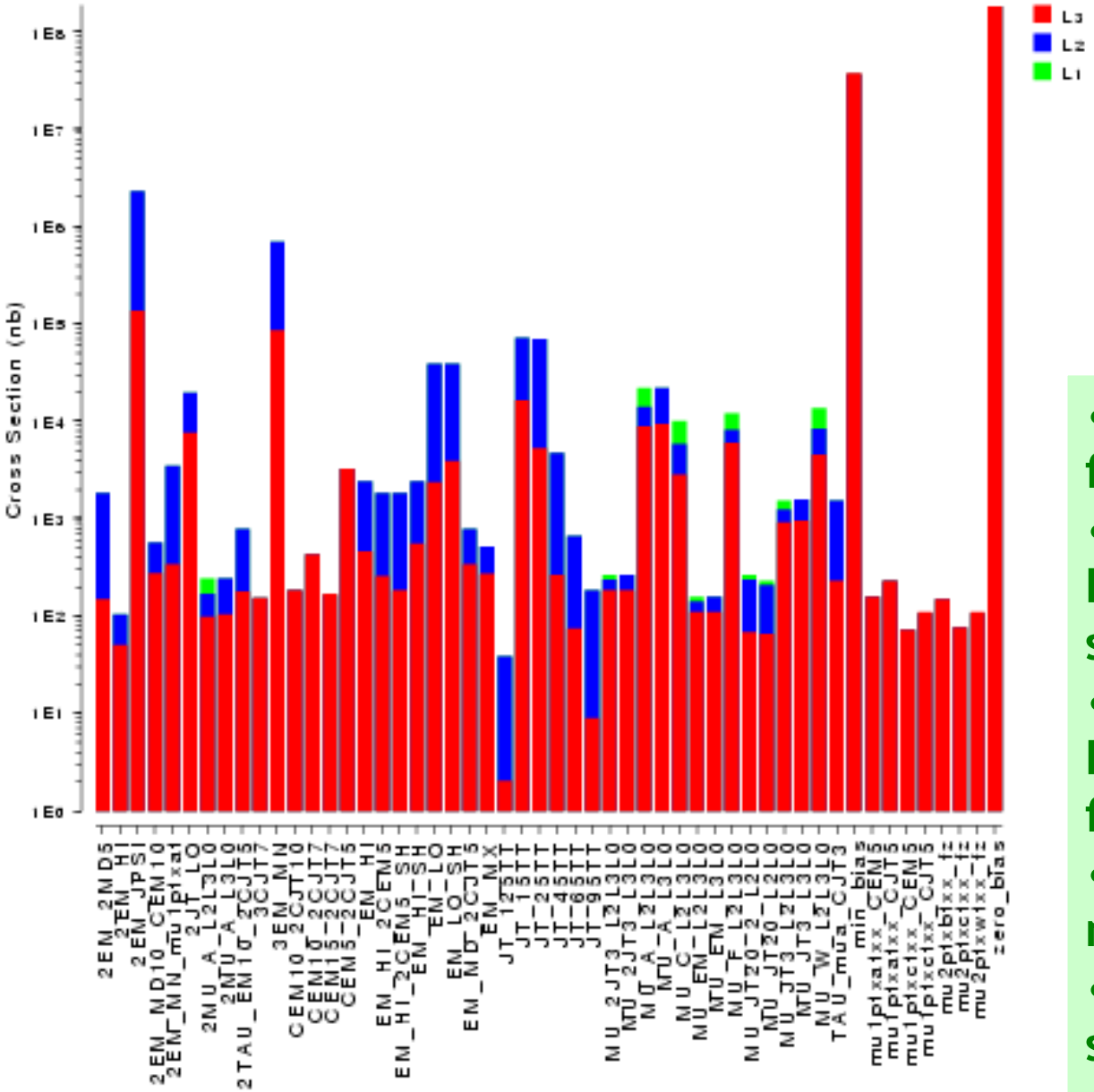
Daily Instantaneous & Integrated Lumi Plots



Delivered: 433.0 nb^{-1} (12.8 hrs of store)
Live: All Runs: 258.7 nb^{-1} (out of 392.3 nb^{-1} utilized)
Physics Runs: 70.3 nb^{-1} (out of 383.9 nb^{-1} utilized)
Live Fraction: 64.2% (using normalizable zero bias triggers)
Live Fraction: 89.0% (using ALL zero bias triggers)
Recorded: Physics Runs: 69.4 nb^{-1}
Rate to Tape: 16.4 Hz (240k events)
Exclusive Down Time:
No recorded runs: 40.7 nb^{-1} (1.3 hours)

- Daily luminosity summary from May 21st 2002.
- Inst. Lumi plotted per hour
- Plot summaries available later the next day in postcript & gif format

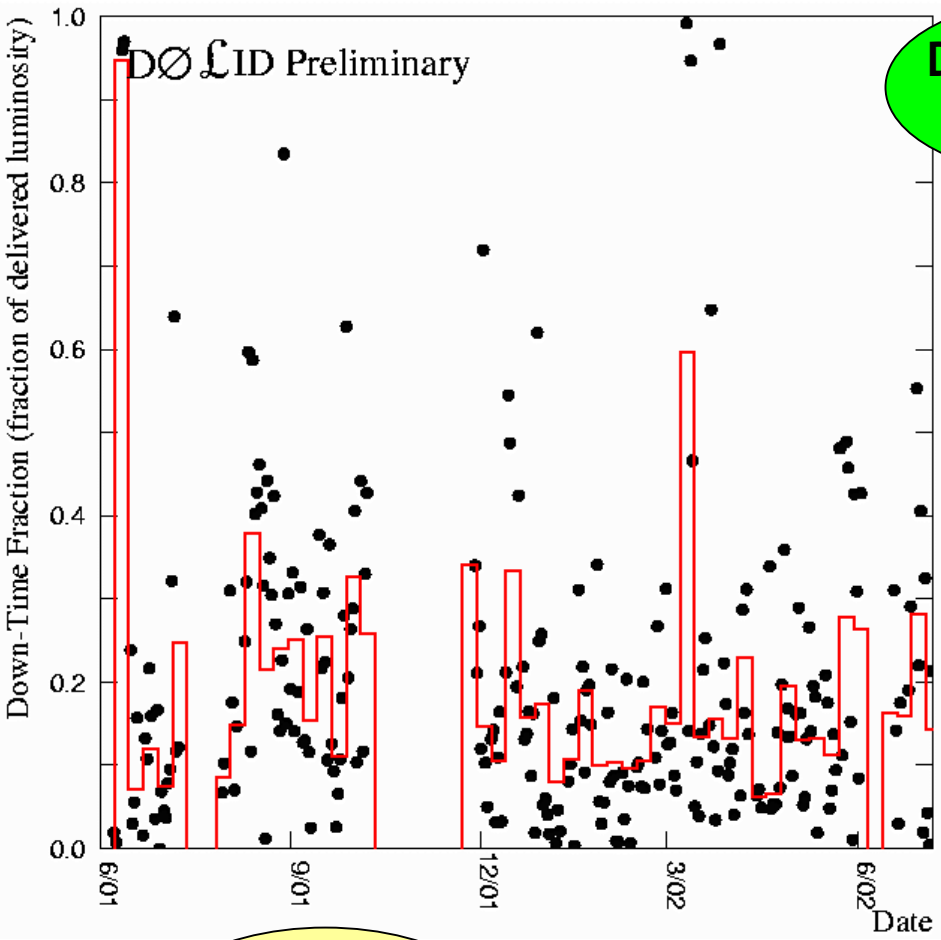
Luminosity: Trigger Summaries



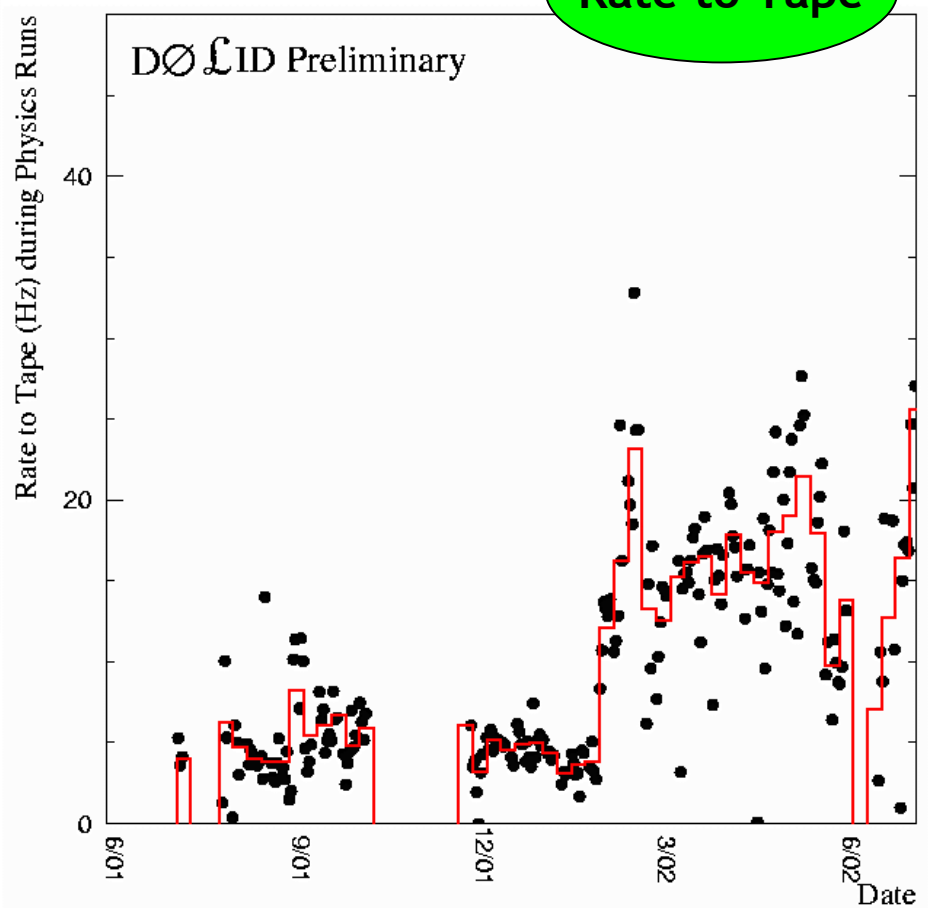
154672	31.1 nb^{-1}	61230
154673	4.2 nb^{-1}	124
154674	15.4 nb^{-1}	36067
154675	68.8 nb^{-1}	134254
154682	14.0 nb^{-1}	9194

- Daily trigger summary from May 21st 2002
- Histograms binned by L3 trigger name in cross section (nb)
- Statistics available for L2 and L3 rejection factor
- Does not correct for multiple triggers
- Individual Run trigger summaries also available

Luminosity: Down-Time & Rate to Tape



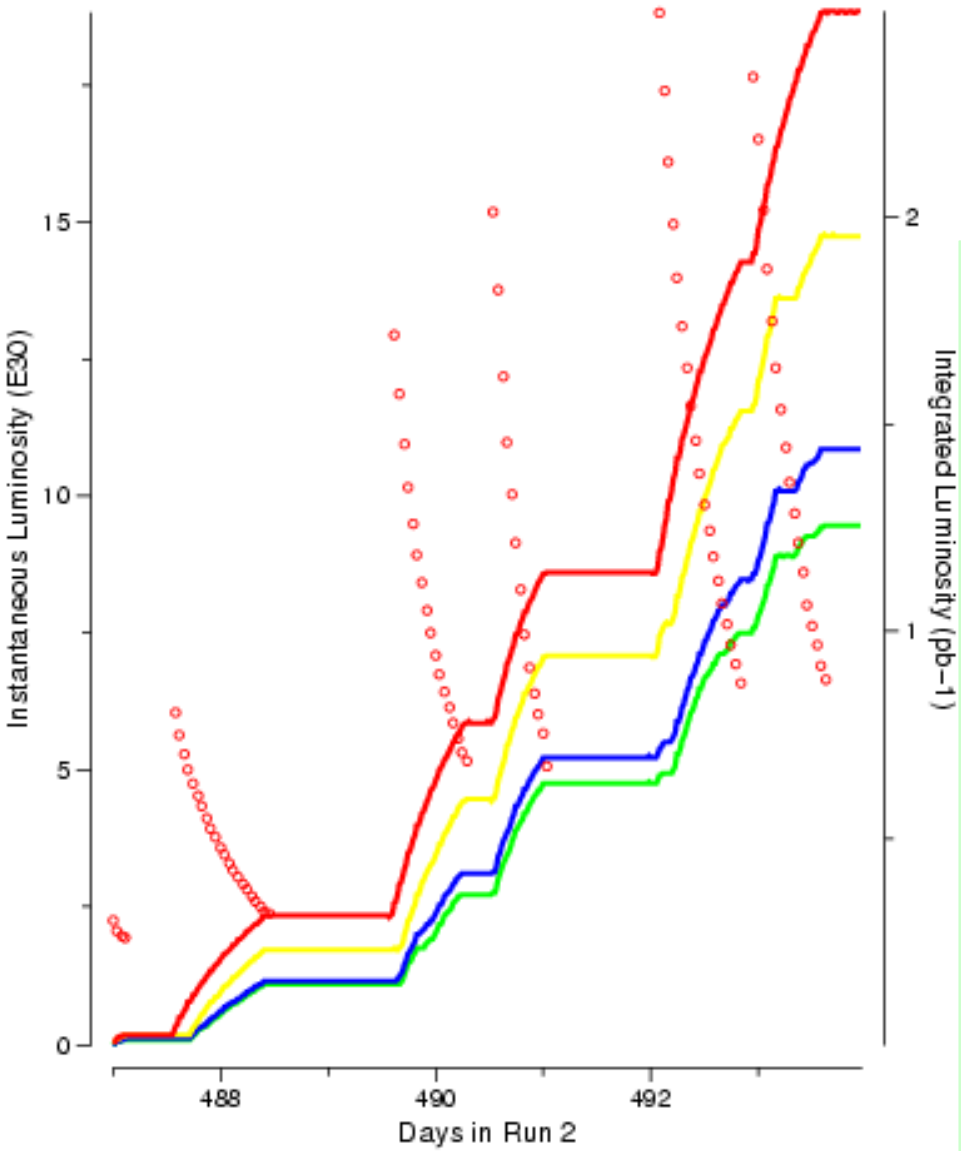
Down-Time Fraction



Rate to Tape

As of midnight July 8th

DØ Luminosity: Week of July 1-7, 2002



Hot off the Presses!

Delivered to DØ: 2495.6 nb^{-1} (in 86.0 hrs of store)
Live: All Runs: 1440.6 nb^{-1} (out of 1956.0 nb^{-1} utilized)
Physics Runs: 1423.4 nb^{-1} (out of 1949.8 nb^{-1} utilized)
Live Fraction: 75.3% (using normalizable zero bias triggers)
Live Fraction: 54.2% (using ALL zero bias triggers)
Recorded Physics Runs: 1254.7 nb^{-1}
Rate to Tape: 22.9 Hz (5786k evts)
Exclusive Down Time: No recorded runs: 539.6 nb^{-1} (15.6 hrs)

Luminosity Goals

- *Near-term goals*
  - o Web-accessible real-time monitoring
  - o Full extension of the DØ-ACNET gateway to include event data, beam position monitor data, etc.
  - o Continual upgrades to improve the Luminosity data acquisition system & reports.
  - o Complete 12+ DØ Notes: luminosity calculation, data acquisition & access tools.

- *Six-month goals*
  - o Commission the Run 2 Luminosity electronics
  - o Luminosity Examine with feedback to the Luminosity DAQ
  - o X,Y (<90 microns),Z (<3 cm) average vertex position
  - o Luminosity Database and appropriate access tools
  - o Proper Monte Carlo simulation of the Luminosity Monitor
  - o Recalculate the lumi constant
  - o Study W/Z for independent normalization

Luminosity ID home page:
http://www-d0.fnal.gov/phys_id/luminosity/
Operations Reports (old style):
http://d0online2/www/groups/lum/reports/
Operations Reports (new style):
file:/luminosity/data/test (Online ONLY for now)

Luminosity Mtg on Tuesday, July 9 @ 11:00 in Dale Hall, Rm 125

Status of Examines

- The goal is to monitor detector performance, triggers and data quality for physics in real time.
- Detector Examines: SMT, CAL, CFT, CPS, MUO
  - Summary histograms for continuous monitoring & comparison with standard ones.
  - Use Hbook/Root output with Histoscope/Root-GUI browser
  - Upgrades with ExamineMgr in progress
- Global Examines *(in test phase)*
  - Physics Examine runs Reco + RecoAnalyze online
    - Root script produces histograms & file PhysicsExamine.root
    - Set up separate Physics Examines
      - Special purposes (physics objects, random sampling)
      - Limited only by online resources
  - Trigger Examine runs d0Analyze online
    - Root script to produce histograms
    - L3 part complete. L1, L2 in construction.

p11.07 current
...
p11.09 shortly

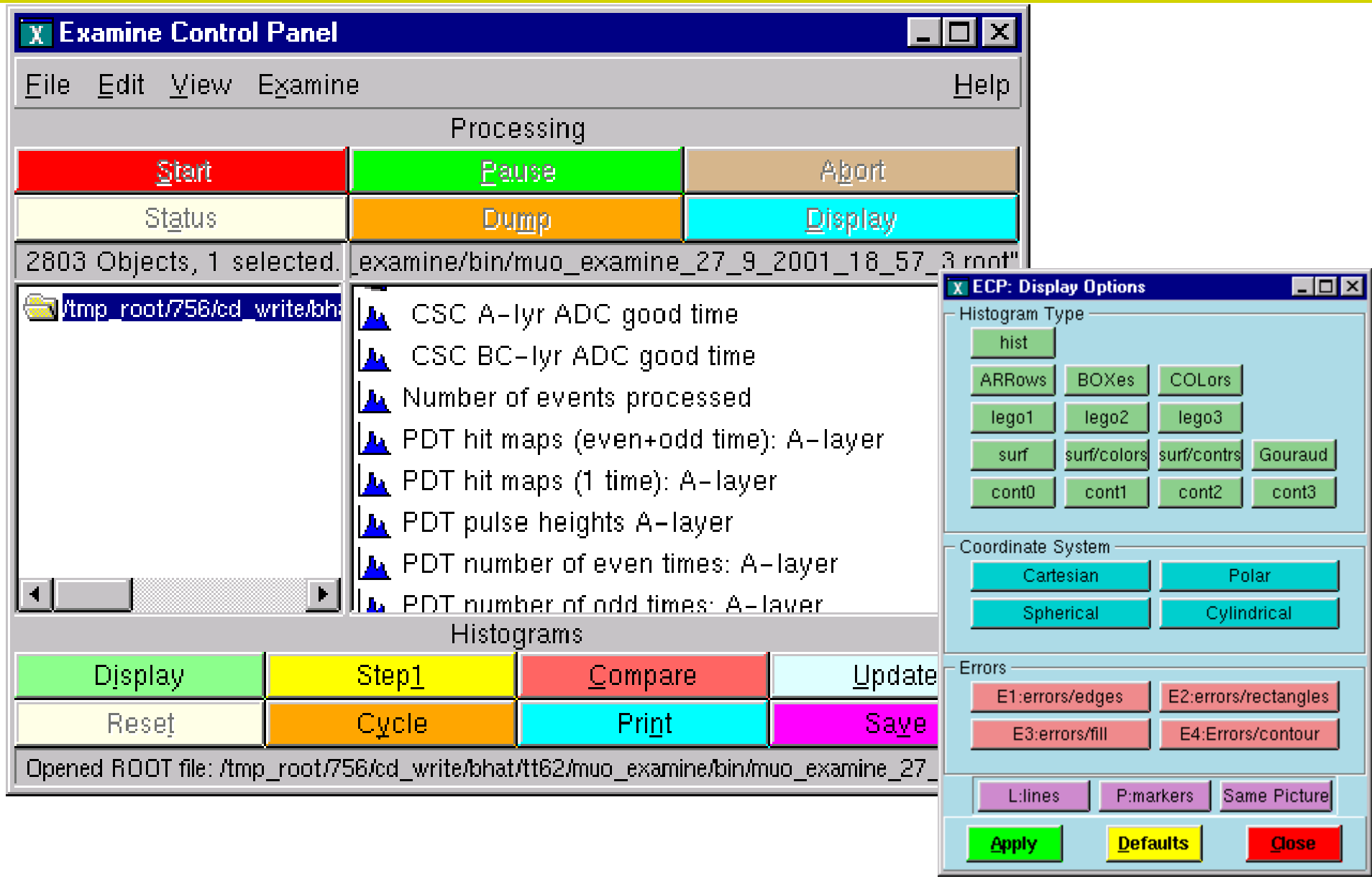
Examines Mtg on Wednesday, July 10 @ 9:00 in Dale Hall, Rm 125

Other Tools & Examine Support Group

- Python GUI for RunInfo
  - Run number, Trigger Config, Streams, Trigger bits info
- Python GUIs for Run Checklists & Run Certification
- Root-GUI as a browser for Root objects

- **Detector Examines**
  - Chabalina, Mayorov/Alton, Canelli, Stutte/Bhat/Hedin
- **Physics Examine**
  - Sanders (development), Kwon (testing & offline DQM plots)
- **Trigger Examine**
  - Sanders, Cheu, Steele, Rost (testing), Kehoe
- **Root-GUI**
  - Joel Snow
- **Python GUI tools**
  - Webb, Bhat
- **ExamineMgr**
  - Bhat, Kwon
- **Online Monitoring Coordinator**
  - Pushpa Bhat (bhat@fnal.gov)

ROOT GUI


Examine Control Panel
File Edit View Examine Help
Processing
Start
Pause
Abort
Status
Dump
Display
2803 Objects, 1 selected.
examine/bin/muo_examine_27_9_2001_18_57_3.root"
/tmp_root/756/cd_write/bh
CSC A-lyr ADC good time
CSC BC-lyr ADC good time
Number of events processed
PDT hit maps (even+odd time): A-layer
PDT hit maps (1 time): A-layer
PDT pulse heights A-layer
PDT number of even times: A-layer
Histograms
Display
Step1
Compare
Update
Reset
Cycle
Print
Save
Opened ROOT file: /tmp_root/756/cd_write/bhat/tt62/muo_examine/bin/muo_examine_27_
ECP: Display Options
Histogram Type
hist
ARRows
BOXes
COLors
lego1
lego2
lego3
surf
surf/colors
surf/contrs
Gouraud
cont0
cont1
cont2
cont3
Coordinate System
Cartesian
Polar
Spherical
Cylindrical
Errors
E1:errors/edges
E2:errors/rectangles
E3:errors/fill
E4:Errors/contour
L:lines
P:markers
Same Picture
Apply
Defaults
Close

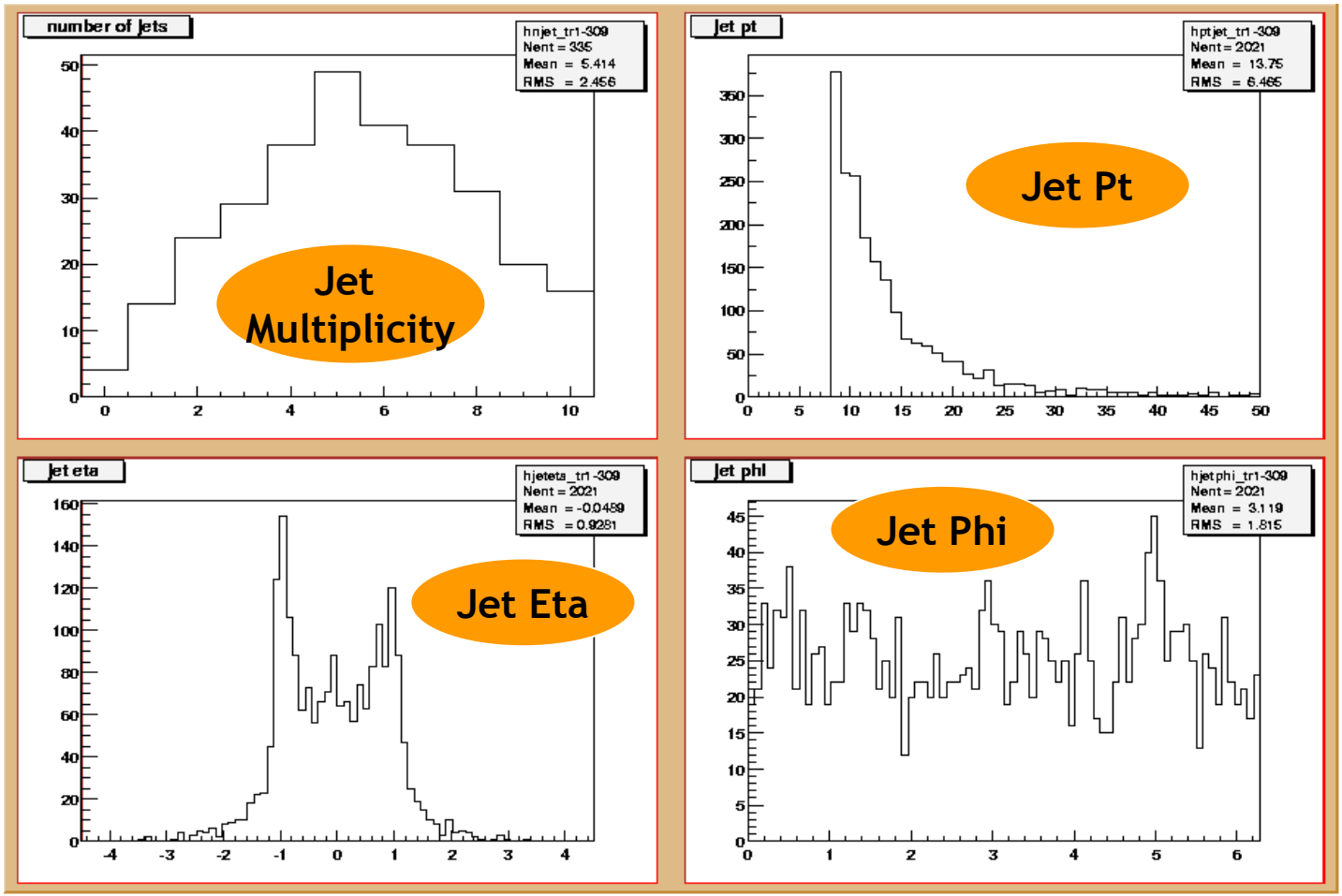
Data Quality Model

Run Physics Examine ➔ Runs Reco + RecoAnalyze

↳ Produces RecoAnalyze.root *(~150 events/hour)*

↳ Root Script makes & saves Histograms to PhysicsExamine.root

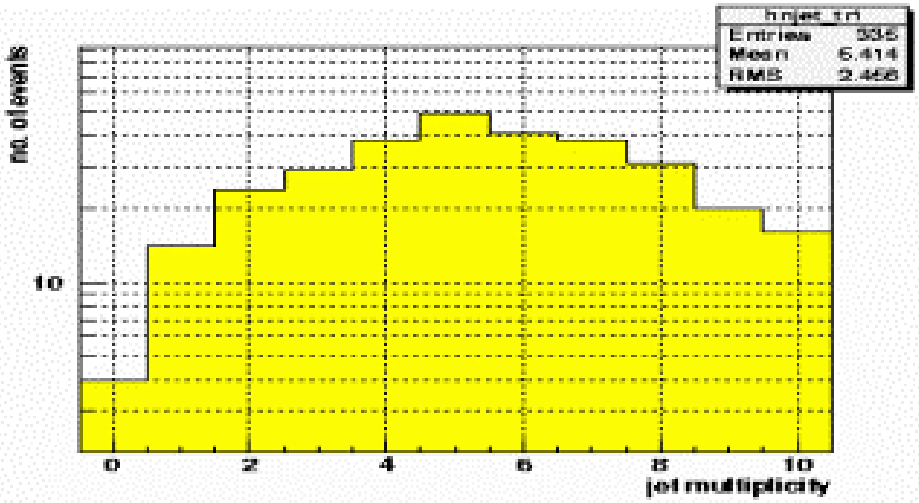
➔ Apply offline Data Quality macros (top, WZ, QCD, etc.)

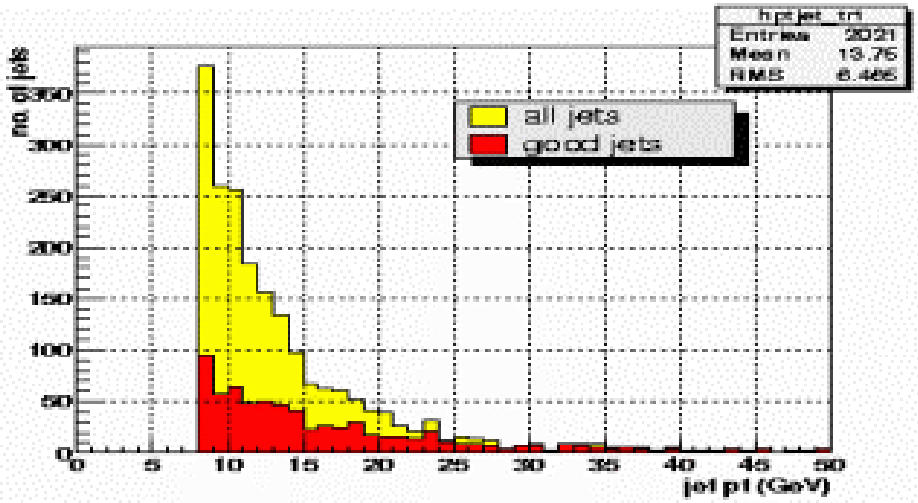


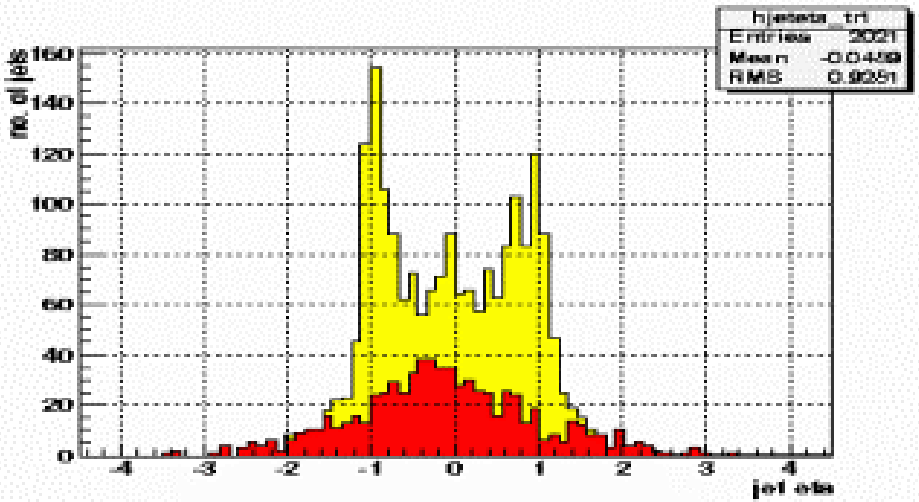
Run Xgooey over PE.root file to make histos

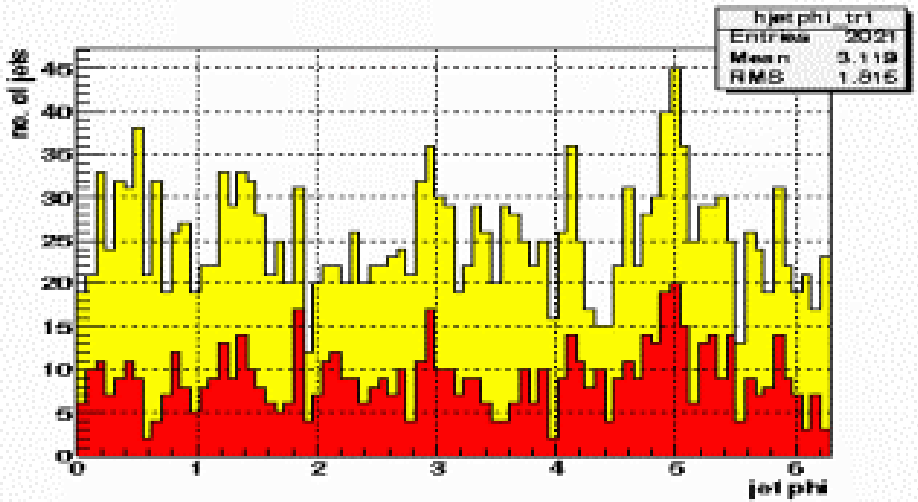
Random Triggers

Plots made from RecoAnalyze.root using offline Top DQM macros







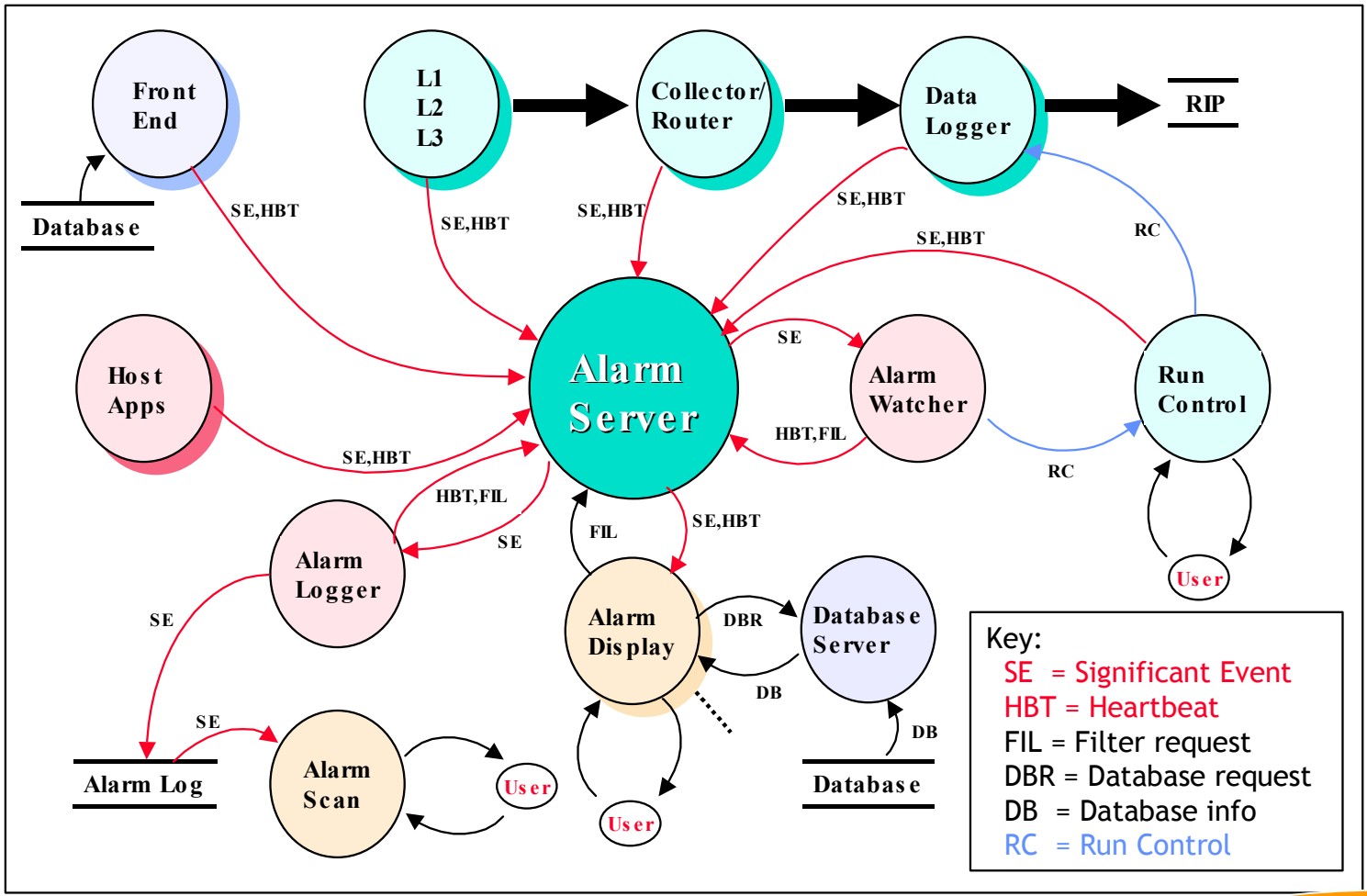


Online Controls Status

- Name/Value Server
  - Based on EPICS process variables
  - All standard EPICS tools available
    - Archiving
    - Alarms
  - Automatic context save and restore
  - Server host installed on d0olctl62
- COMICS Download
  - Verify mode completed and tested
  - New release pending
    - More robust code
    - Error recovery with retries
    - Transaction log
    - Extensible load actions
  - Expert GUI under development
- EPICS Access Control
  - Access control restricts accounts and nodes that are permitted to alter the detector state
  - Currently installed
    - Muon platform devices
    - All HV systems
  - Being extended to the entire detector

Online Mtg on Wednesday, July 10 @ 14:00 in Dale Hall, Rm 125

Significant Server Flowchart



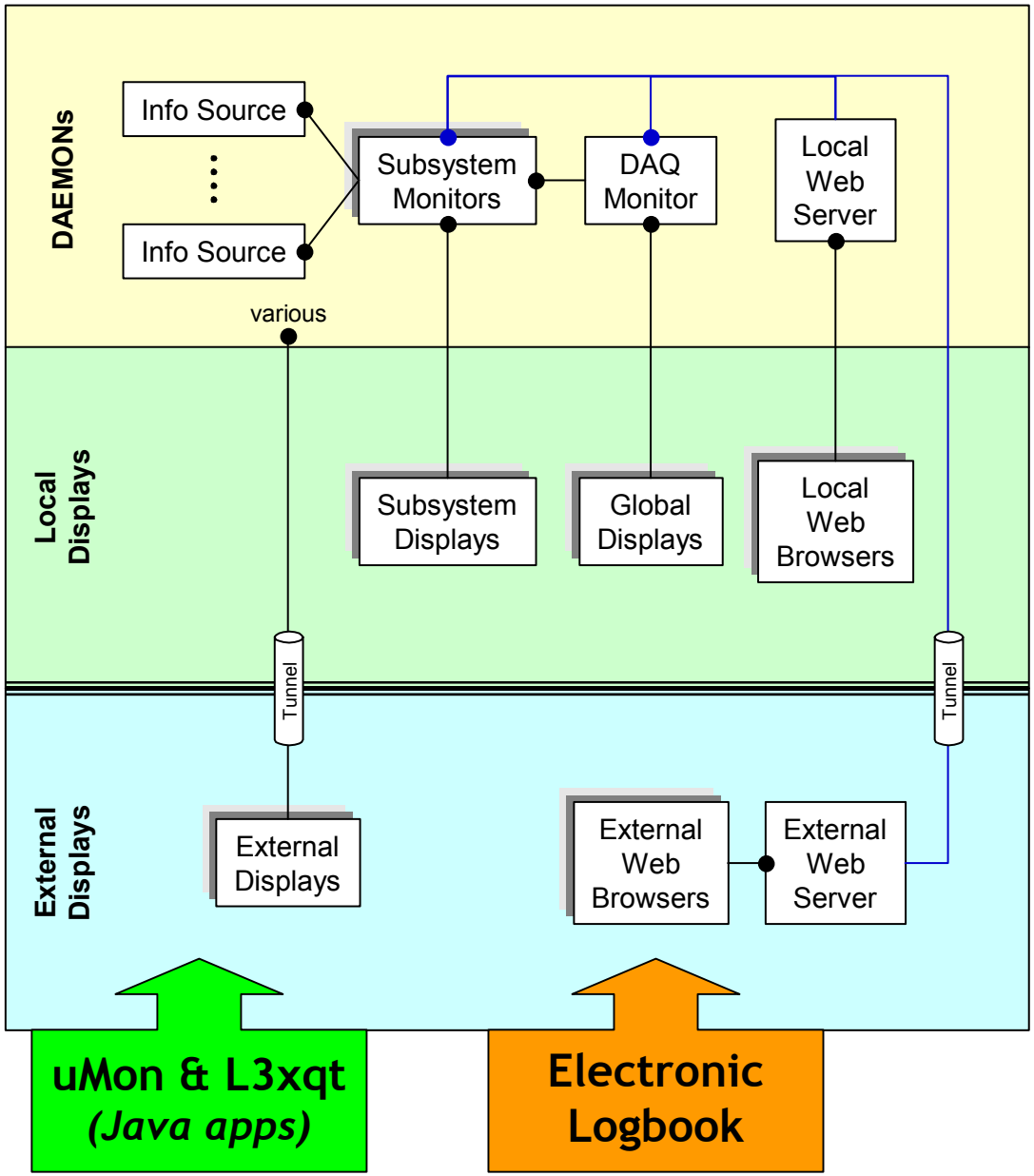
Most database templates modified to declare alarms

Guidance & command script options added to SES Display GUI

- Alarm watcher released
  - Auto-Pause mode tested but not in use *[Very Soon!]*
  - Voice-Based alarm notification in use
  - Most database templates modified to activate watcher for serious conditions

We need to take alarms very seriously from now on!

DØ Online Monitoring Architecture



Info Sources:
- SBCs
- Level 1 / 2 / 3
- C/R, DL, DD

Subsystem Monitor optional intermediate

Server ● — Client

Web Servers get info directly from Monitors or from shared disk areas

External Web Server and Displays require ACL tunnel, read-only

No external access to Local Web Server

Electronic Logbook

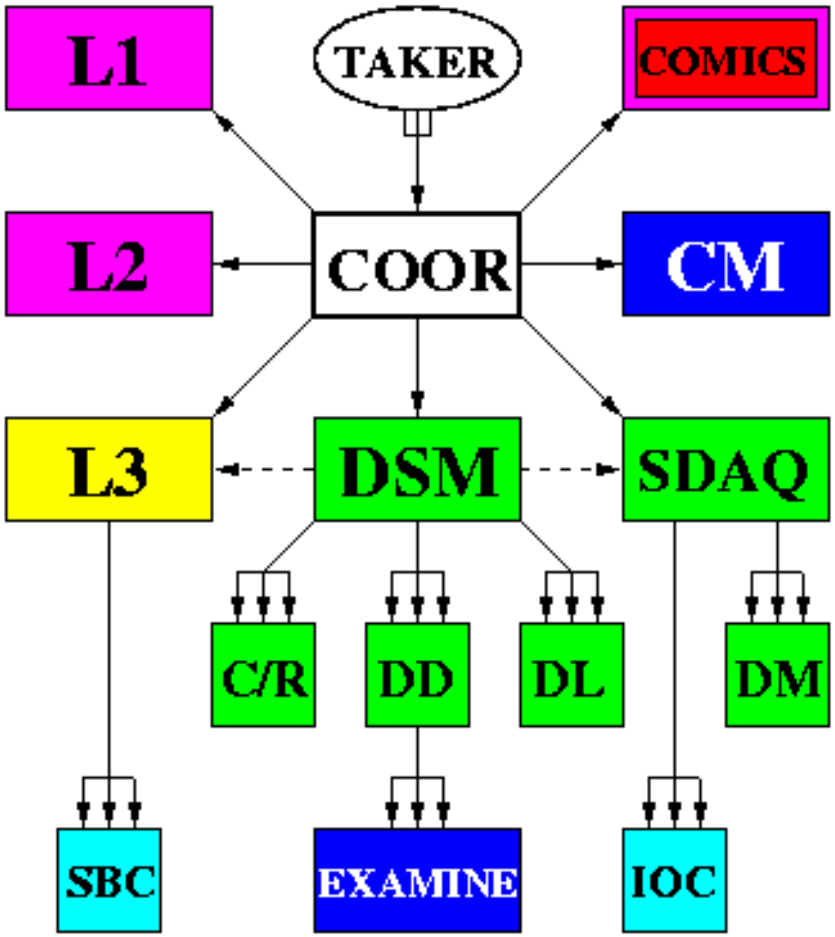
- Entries not archived after 4 hours (adjustable) will produce a pop-up "nag" window & additional header in the display.
- Entries are checkpointed after 2.5 minutes (adjustable) and recoverable in case of accidental deletion or machine crash.
- The capabilities of forms are expanded. This won't be evident until we program forms to use the features. Tables and "repeated blocks" are supported.
- You can select an entry with a single left-button mouse click. This works more like Windows now, with a control-click "adding" to a selection.
- Once an entry is selected, the right-button will give action options.
- A double click on the right side "action" buttons (eg "Text") will invoke the action without need for the "drag and drop".
- The active keywords are displayed in the entry header.
- There is a new "Plain Text" entry type which uses a fixed pitch font, better for aligning items.
- This version uses Java V1.4, which is supposedly faster.
- Containers now have a Status Bar at the bottom showing how many entries are selected within that container.
- Forms may contain embedded forms.
- A new feature of forms has been implemented that you can now have an editable pull down select box.

V1.6.05

Waiting for a Java bug fix…

V1.7.01

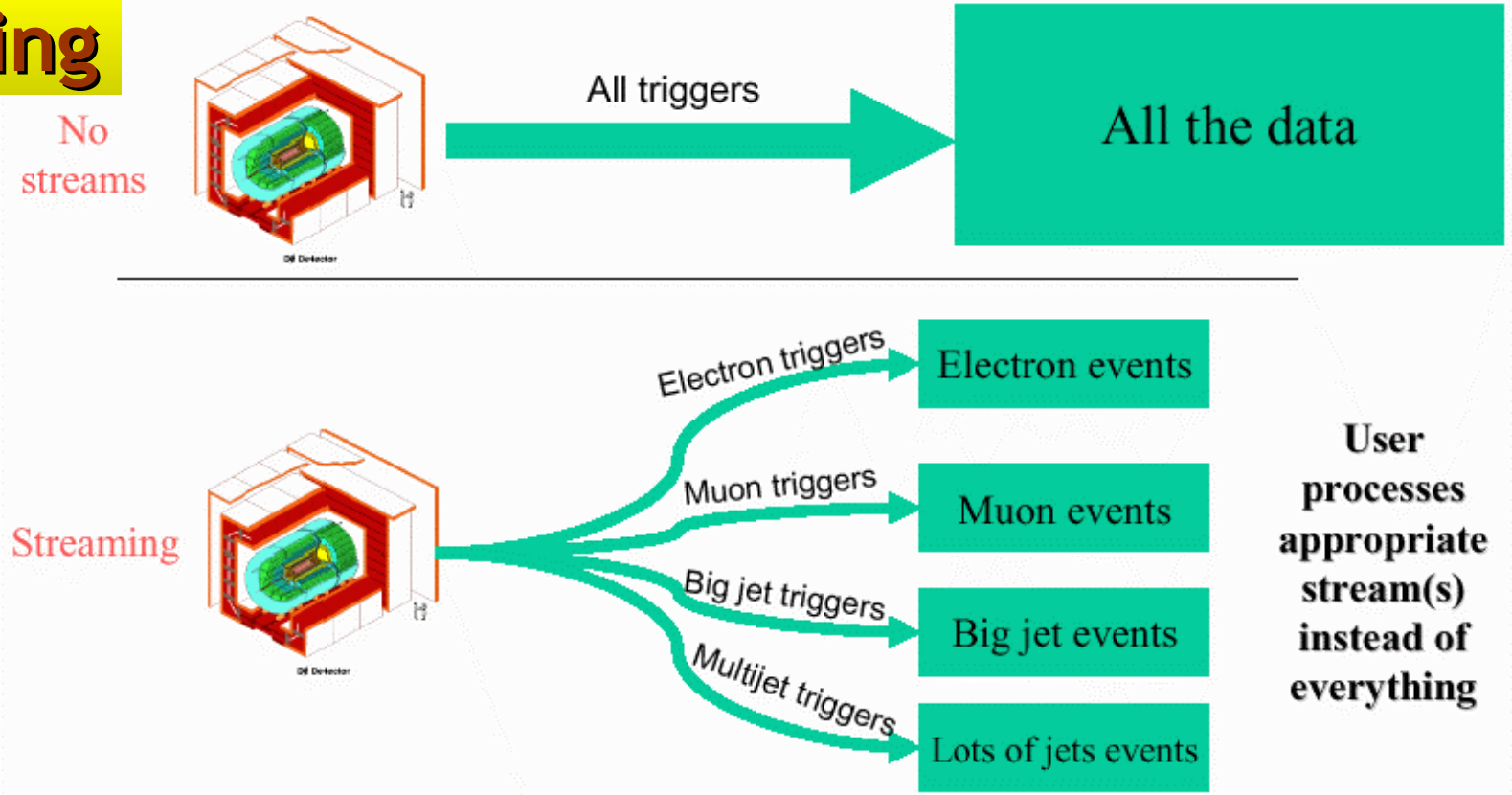
Online Data Support Status



D0 control flow

- ODS products essentially are in maintenance or bugfix mode; no serious development is foreseen for these packages:
  - Collector, datalogger, datalogger_util, sdaq, distributor, dlcat, dlsam, dsm, itc, itc_event
- We are not yet in the true streaming mode, so we still may need to make some adjustments once we have gained more experience with it (but such changes ought not to be tremendous).
- Not yet clear whether the current operation of Examines is satisfactory in the long run, and if not, whether the DD needs to be modified accordingly (probably not much).
- Some minor SDAQ changes or extensions.
- A fix for ITC is underway that hopefully is sufficient to get rid of the huge memory usage of some programs on RedHat 7 Linux.
- A fix for the DD is underway that repairs a flaw in the API by which an Examine sometimes does not get events for a while.
- DAQ status page will be enhanced a bit.

Streaming



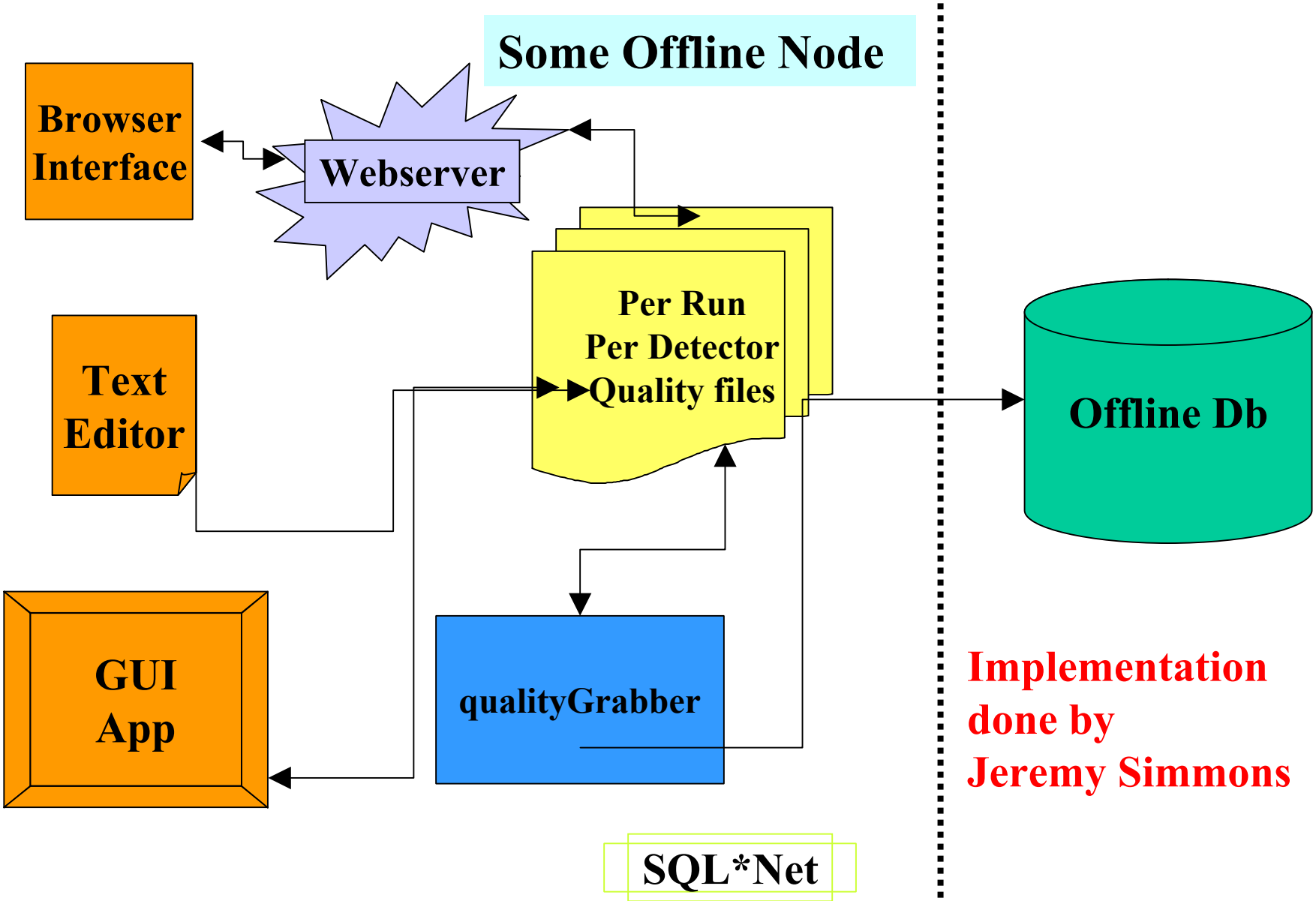
- The current model will only become more inefficient over time
  - Huge data quantities – cannot afford duplicate tapes
  - Triggers are typically a very small subset of the data
  - Can't avoid processing all events
- Need flexible model to stores data objects sensibly & optimize the users' time
  - Tapes have finite lifetime – minimize the numbers of times accessed
  - Smaller number of data files = faster reconstruction time

Streaming Mtg on Thursday, July 11 @ 11:00 in Nielson Hall, A102

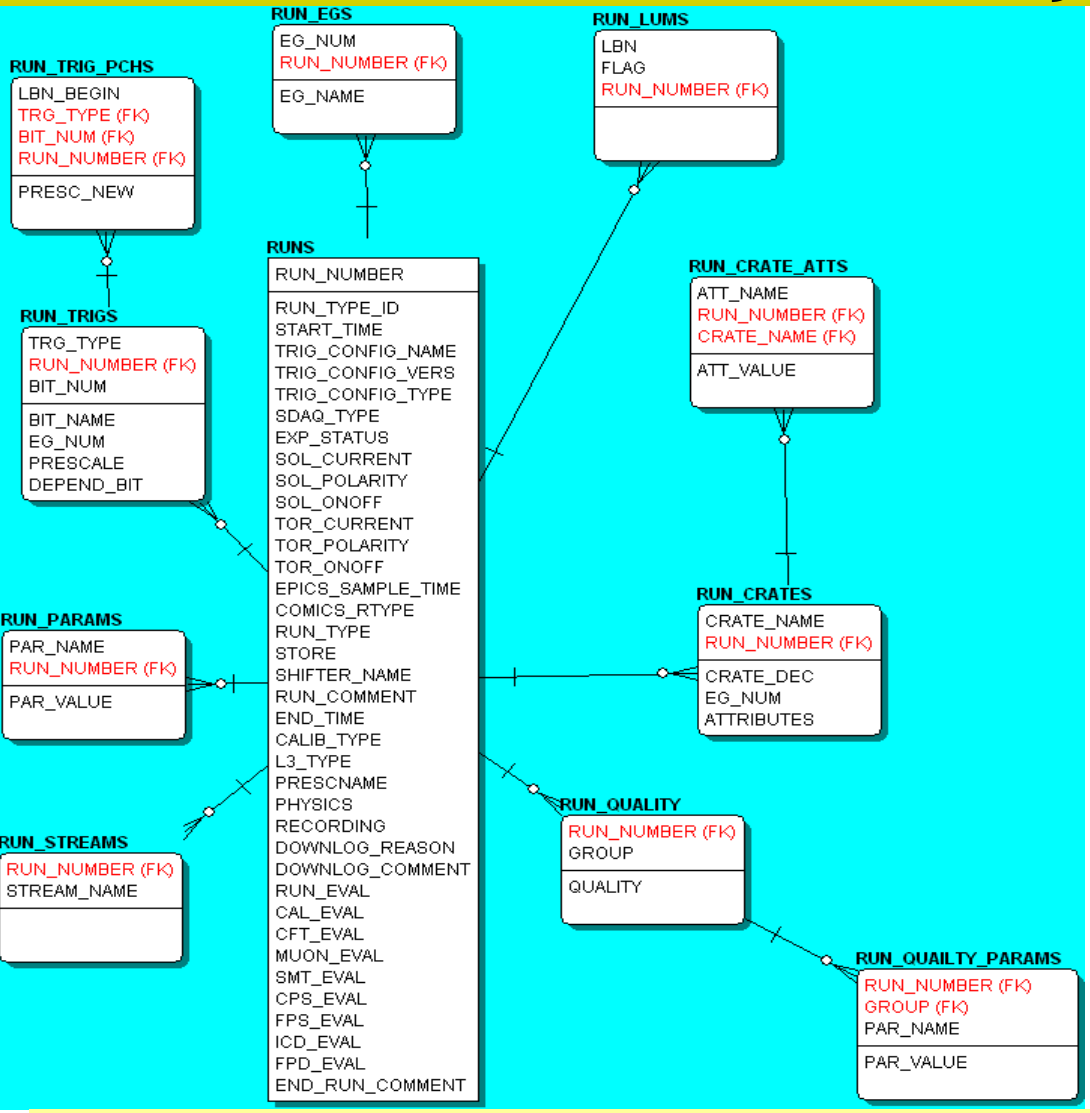
Offline Data Quality

- Quality information can be stored per quality group
  - Detector (currently CAL, SMT, CFT, MUO)
  - Object ID (currently MET,JET)
  - Future: Physics Examines, Triggers, FPD, Tracking, etc.
- For all these quality groups a minimum of one status word is being stored which has a structure common to all groups
  - **Good:** A physics run with no known problem, which likely can be used for physics analysis & publication
  - **Reasonable:** A physics run with minor problems which can perhaps be used for physics analysis but needs to be treated with care
  - **Bad:** This run should not be used
  - **Special:** A run for experts only - special conditions
  - **Unknown:** This run has not be classified (default)
- Provide for general use: reco, root, thumbnail

Offline Data Quality Structure



Offline Data Quality Management



Specifications

The files are produced per run with the name:

<group>_<run_number>.dat

The file contains:

group: <group_name>

run: <run_number>

status: <status_value>

<parameter_name>: <parameter_value>

(alphanumeric)

...

Example file MUO_146437.dat contains:

group: MUO

run: 146437

status: REASONABLE

grade:C

comment: PDT 217 back in read. New CF BC scint thresholds+HV.

Every group obtains userid & password to enter & update information.

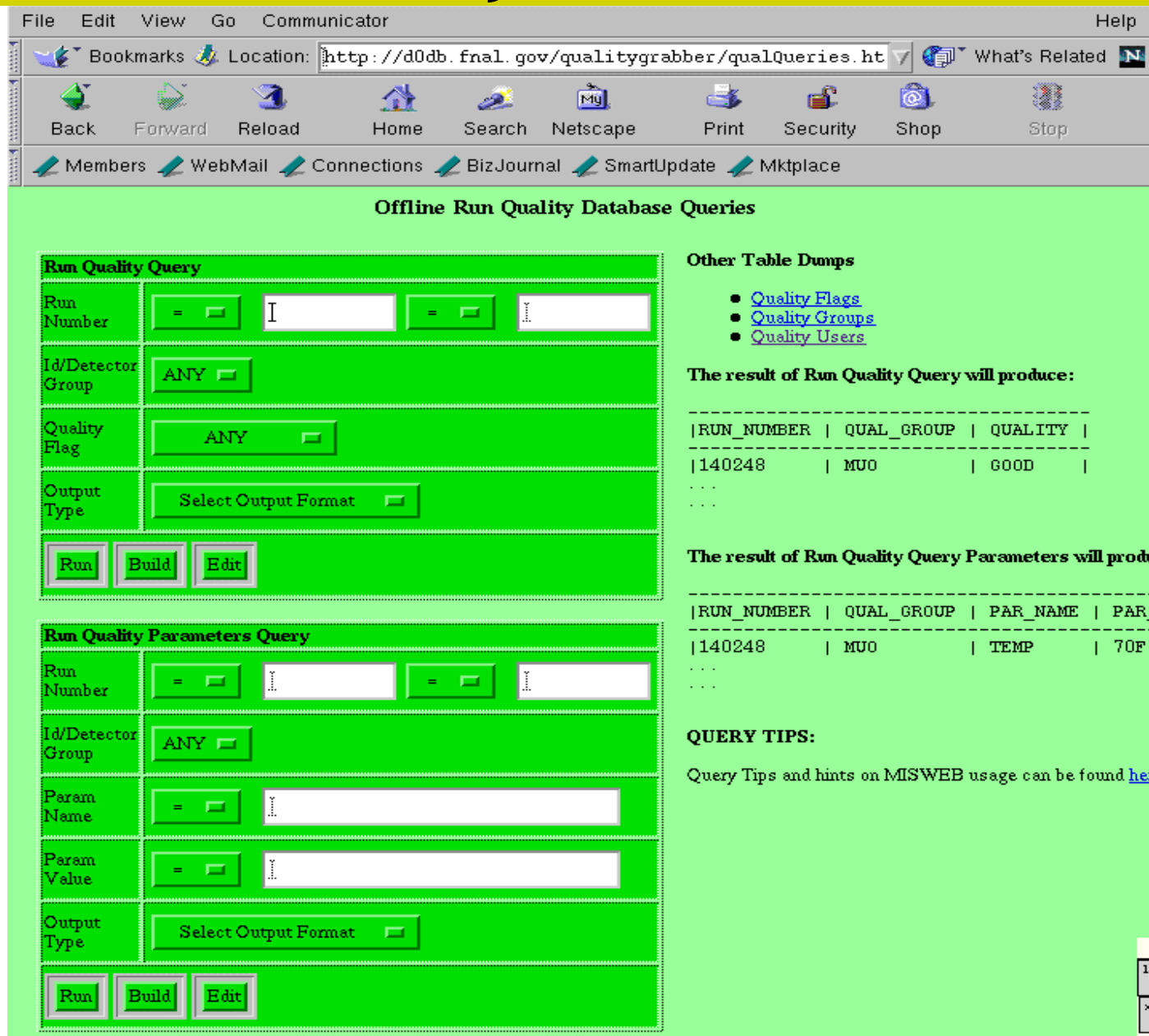
Administrator adds groups, flags. Only administrator can delete information.

Offline Run Quality Database

Currently included in the database:

- Tom's list including grades and comments
- JET/MET good and bad run list
- An (incomplete) list of bad SMT, CFT, CAL runs with less than 3 crates in read-out

All new physics runs automatically entered as unknown

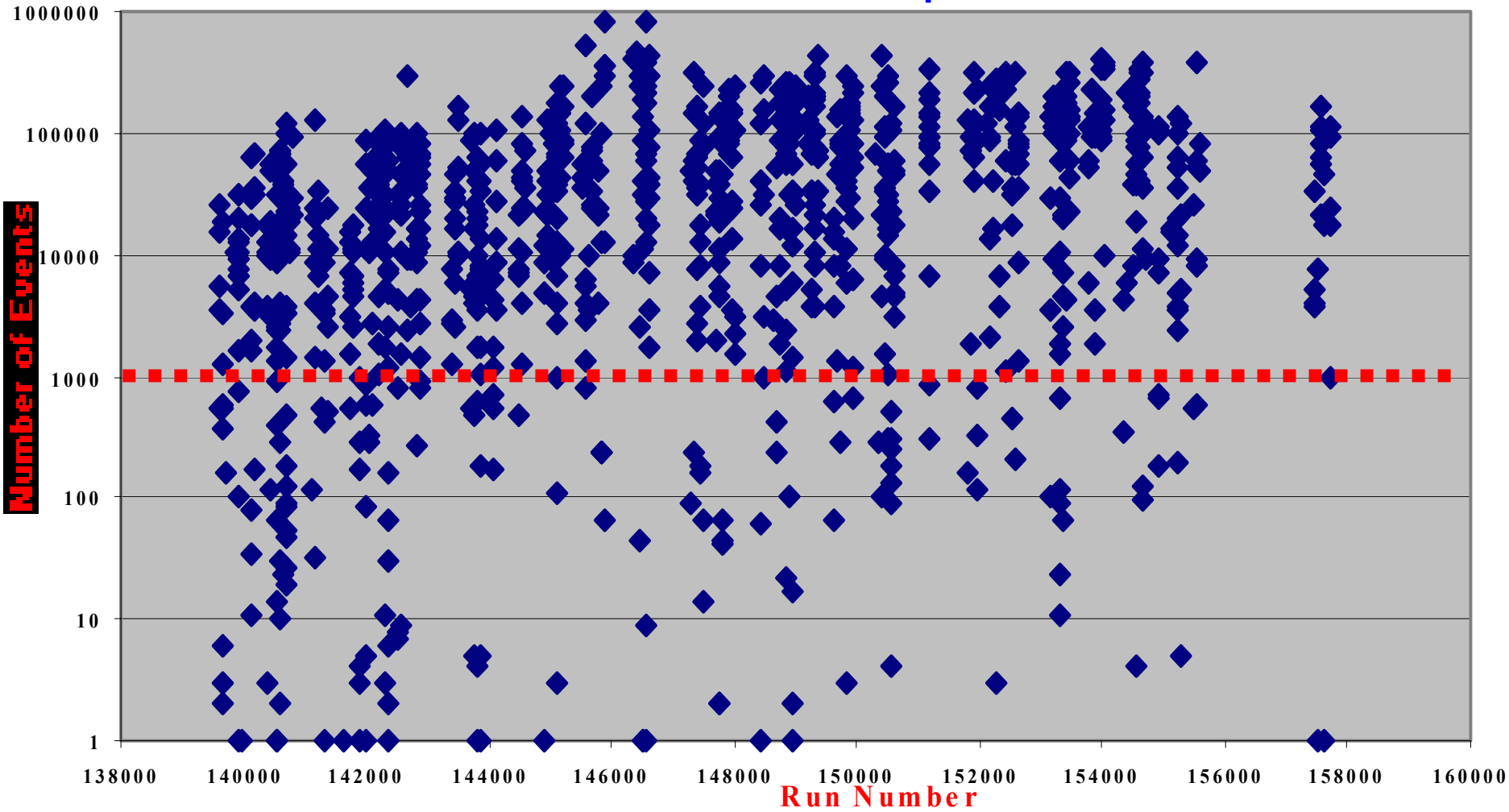


Future Goals for Offline Quality

- First production version of run quality data base can and should be used for analysis.
- Future:
  - Provide status information directly at the thumbnail/root -tuple levelbased on a method which reads info using database server.
  - Add number of events to Run Summary. Coming soon.
  - Template: magnetic field (Slava Kulik). In preparation.
  - Add run quality in SAM query (in preparation).
  - The various detector or id groups should start to enter information into the database. Every group obtains an userid/password.
  - `Private' lists should disappear to avoid confusion.
  - We urgently need online examine output run by run.
  - Run quality database & access will be improved in contact with users

Run Quality Mtg on Tuesday, July 9 @ 18:00 in Nielson Hall, Rm 209

Estimated Number of Events per Run



16.3% of global_CalMuon runs recorded less than 1000 events per run. *(28 Nov 2001 - 24 June 2002)*
But, those runs contain less than 0.05% of Total Num. Events.

1035 Runs with 1 or more events

Conclusions

"My job was supposed to be obsolete by now" - *Leslie Groer*

- Time to become an Experiment ➔ *Standardize & Automate*
  - Data Taking Procedures
    - Minimize day to day configuration changes
    - Improve Recorded to Utilized Fraction
  - Data Quality
    - Online Physics Monitoring
    - Alarms must be taken seriously from now on
  - Shift Scheduling & Training
    - Efficiently & effectively use available manpower
  - Propagation of Information & Diffusion of Knowledge
    - Centralized repository (web-based)
    - Daily Summaries culled from multiple sources
    - Document, document, document!

"…Get ready for a long steady-state physics generating period." - *John Womersley*